TM 11-525-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATING INSTRUCTIONS RADIO SET ARC TYPE 12

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1958

TECHNICAL MANUAL

OPERATING INSTRUCTIONS
RADIO SET ARC TYPE 12

TM 11-525-10
CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *15 September 1961*

TM 11-525-10, 20 March 1958, is changed as follows:

Add the following:

APPENDIX I
BASIC ISSUE ITEMS LIST
CONTROL, RADIO SET C-3389/ARC

Section I. INTRODUCTION

1. Scope

a. This appendix lists items supplied for initial operation. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

b. Columns are as follows:

(1) *Source, maintenance, and recoverability code.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by Model.* Not used.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items are indicated by NX.

(7) *Quantity authorized.* Under "items comprising an operable equipment," the column lists the quantity of items supplied for the initial operation of the equipment.

(8) *Illustrations.* Not used.

2. References

A maintenance allocation chart showing all repair operations authorized to be performed by the respective echelons of maintenance is contained in TM 11-525-25.

3. Comments or Suggestions

Any comments concerning omissions and discrepancies in this appendix will be prepared on DA Form 2028 and forwarded direct to Comanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N. J.

Section II. FUNCTIONAL PARTS LIST

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
	5821-542-7215		CONTROL, RADIO SET C-3389/ARC: manual control type; dc; 360 deg range of reciever tuning; 17 position transmitter frequency selector switch; enamel finish aluminum case; 5 3/4 lg x 3 3/4 wd x 3 4/8 dp; ARC part NO: 19250 (28v)					
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
			CONTROL, RADIO SET: C-3389/ARC (BASIC COMPONENT)		NX	1		
	Ord thru AGC		TECHNICAL MANUAL TM 11-525-10			2		
			RUNNING SPARES AND ACCESSORY ITEMS					
			NO PARTS AUTHORIZED FOR STOCKAGE AT FIRST ECHELON					

By Order of the Secretary of the Army:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official

R. V. LEE,
Major General, United States Army
The Adjutant General.

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USATC Inf (2)
Svc Colleges (2)
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GENDEP (2) except
Atlanta GENDEP (none)
Sig Sec, GENDEP (5)
Sig Dep (12)
USA Corps (3)
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AFIP (1)
WRAMC (1)
AFSSC (1)
USAEPG (2)
EMC (1)
USACA (2)
USASEA (1)
USA Carib Sig Agcy (1)
USA Sig Msl Spt Agcy (12)
USASSA (20)
USASSAMRO (1)
Army Pictorial Cen (2)
USAOMC (3)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
AMS (1)
Sig Fld Maint Shops (3)
JBUSMC (2)

Units organized under following TOE:

11-7 (2)
11-16 (2)
11-57 (2)
11-98 (2)
11-117 (2)
11-155 (2)
11-500 AA-AE (4)
11-557 (2)
11-587 (2)
11-592 (2)
11-597 (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

B23726

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Technical Manual)
)
No. 11-525-10)

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington 25, D. C., 20 March 1958

RADIO SET ARC TYPE 12

Section Page

I GENERAL DESCRIPTION 1

1-1. Purpose of Handbook 1
1-3. Purpose of Equipment 1
1-5. Model Differences 1
1-8. Equipment Supplied 1
1-10. Equipment Required But Not Supplied 5
1-12. Extreme Temperature Operating Limitations 5
1-16. Description of Radio Receivers 5
1-17. Radio Receiver ARC Type R-10A 5
1-20. Radio Receiver ARC Type R-11A 6
1-22. Radio Receiver ARC Type R-15 6
1-26. Radio Receiver ARC Type R-19 6
1-27. Radio Receiver ARC Type R-20 6
1-29. Description of Radio Transmitters 7
1-30. Radio Transmitters ARC Type T-11A and T-11B 7
1-35. Radio Transmitters ARC Type T-13 and T-13A 7
1-38. UHF Transverter ARC Type TV-10 8
1-42. Description of Dynamotors 8
1-43. Dynamotors ARC Types D-10 and D-10A 8
1-44. Description of Control Units 8
1-45. General 8
1-46. Control Unit ARC Type C-16 10
1-47. Control Unit ARC Type C-17 10
1-48. Control Unit ARC Type C-18 10
1-49. Control Unit ARC Type C-24 10
1-50. Control Unit ARC Type C-25 10
1-51. Control Unit ARC Type C-36 11
1-52. Control Unit ARC Type C-37 11
1-54. Control Unit ARC Type C-38 11
1-55. Control Unit ARC Type C-39 11
1-56. Control Unit ARC Type C-40 11
1-57. Control Unit ARC Type C-44 11
1-58. Control Unit ARC Type C-46 11
1-59. Control Unit ARC Type C-47 11
1-60. Control Unit ARC Type C-48 12
1-61. Control Unit ARC Type C-49 12
1-62. Control Unit ARC Type C-50 12
1-63. Control Unit ARC Type C-52 12
1-64. Control Unit ARC Type C-53 12
1-66. Control Unit ARC Type C-54 12
1-67. Control Unit ARC Type C-55 12
1-68. Control Unit ARC Type C-56 12
1-69. Description of Antennas 13
1-70. Antenna ARC Type A-12 13
1-71. Antenna ARC Type A-15 13
1-72. Antenna ARC Type A-16 13
1-73. Loop Antennas ARC Type L-10 and L-10A 13
1-74. Antenna Kit ARC-12296 13
1-75. Description of Relay Units 13
1-76. Muting Relay ARC Type K-11 13
1-77. Relay Unit ARC Type K-12 13
1-78. Oscillator-Relay Unit ARC Type K-13 13
1-80. Description of Mountings 14
1-82. Description of Junction Boxes 14
1-83. General 14
1-84. Junction Box ARC Type J-12 14
1-85. Junction Boxes ARC Type J-13 and J-13A 14
1-86. Junction Boxes ARC Type J-15 and J-15A 14
1-87. Description of Jack Box ARC Type J-10 14
1-89. Accessories 14

Section			Page
II	OPERATING PROCEDURES		15
	2-1.	General Operation Information	15
	2-12.	Location and Function of Operating Controls	16
	2-14.	Operation, Preflight	34
	2-15.	R-10A or R-11A Receiver	34
	2-16.	R-15 or R-19 Receiver	35
	2-17.	R-20 Receiver	35
	2-18.	T-11A, T-11B, T-13, or T-13A Transmitter	35
	2-19.	TV-10 Transverter	35
	2-20.	Dual-Control Installation	35
	2-21.	Operation, Airborne	35
	2-22.	R-10A or R-11A Receiver Operation With Fixed-Wire Antenna	35
	2-23.	R-10A or R-11A Receiver Operation With Loop Antenna	36
	2-24.	Determination of Station Bearing, Method 1	36
	2-25.	Determination of Station Bearing, Method 2	36
	2-26.	R-15 or R-19 Operation	36
	2-27.	R-20 Operation	36
	2-28.	T-11A, T-11B, T-13, or T-13A Operation	36
	2-29.	TV-10 Operation	37
	2-30.	Operation of Dual-Control System	37
	2-31.	Operation, Secure	37
	2-33.	Emergency Turn-Off Procedure	37
III	OPERATING CHECKS AND ADJUSTMENTS		38
	3-1.	Preflight Operating Checks and Adjustments	38
	3-3.	Airborne Operating Checks and Adjustments	39
IV	EMERGENCY OPERATION AND REPAIR		41
	4-1.	Emergency Operation	41
	4-3.	Emergency Repair	42
	4-4.	General	42
	4-5.	Replacement of Crystals	42
	4-6.	Replacement of Electron Tubes	42
	4-7.	Replacement of Lamps	42
	4-8.	Replacement of Fuses	42
	4-10.	Location Diagrams of Electron Tubes and Crystals	42
	4-12.	Schematic Diagrams	42

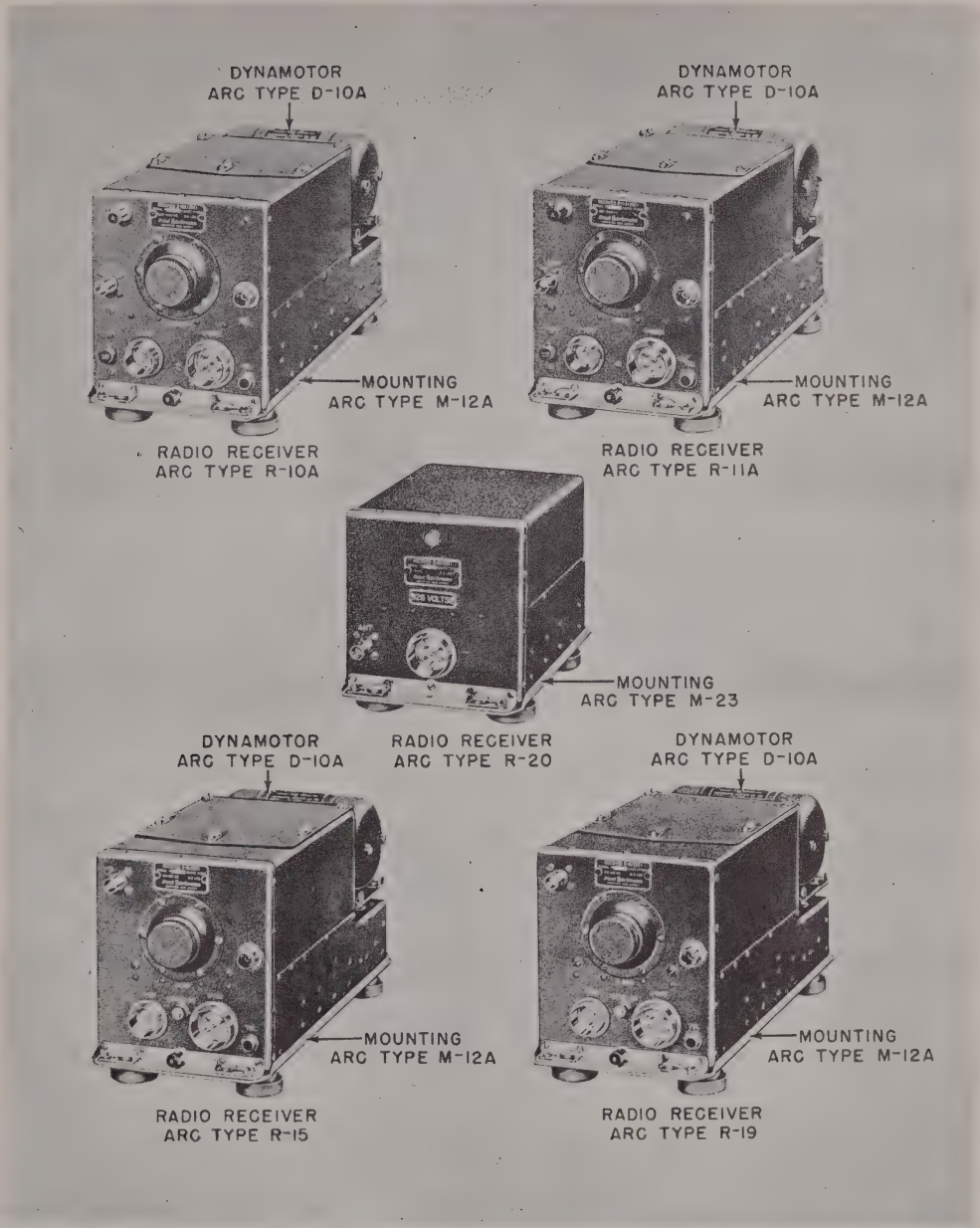


Figure 1-1. Radio Set ARC Type 12, Radio Receivers, with Dynamotors and Mountings

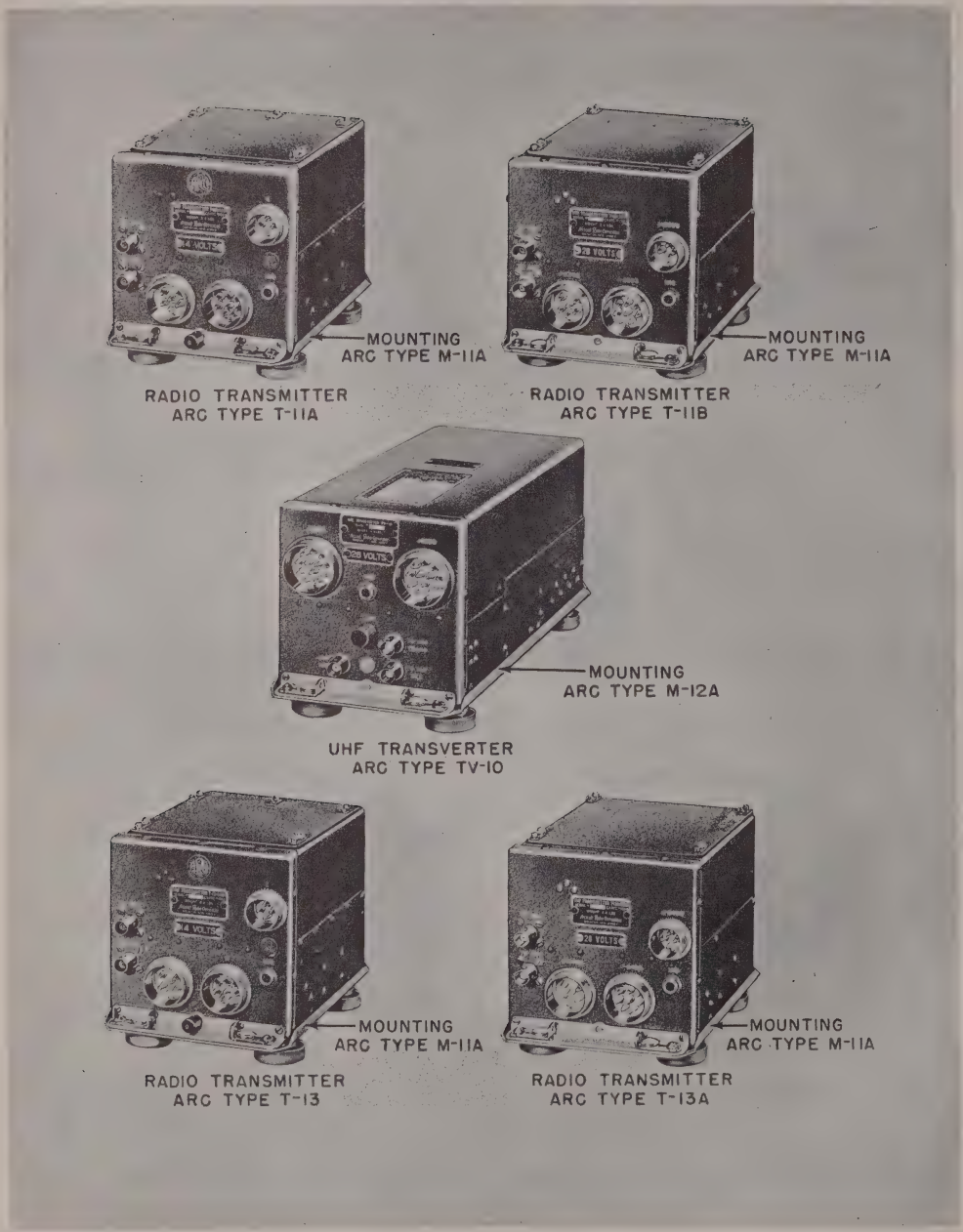


Figure 1-2. Radio Set ARC Type 12, Radio Transmitters, with Mountings

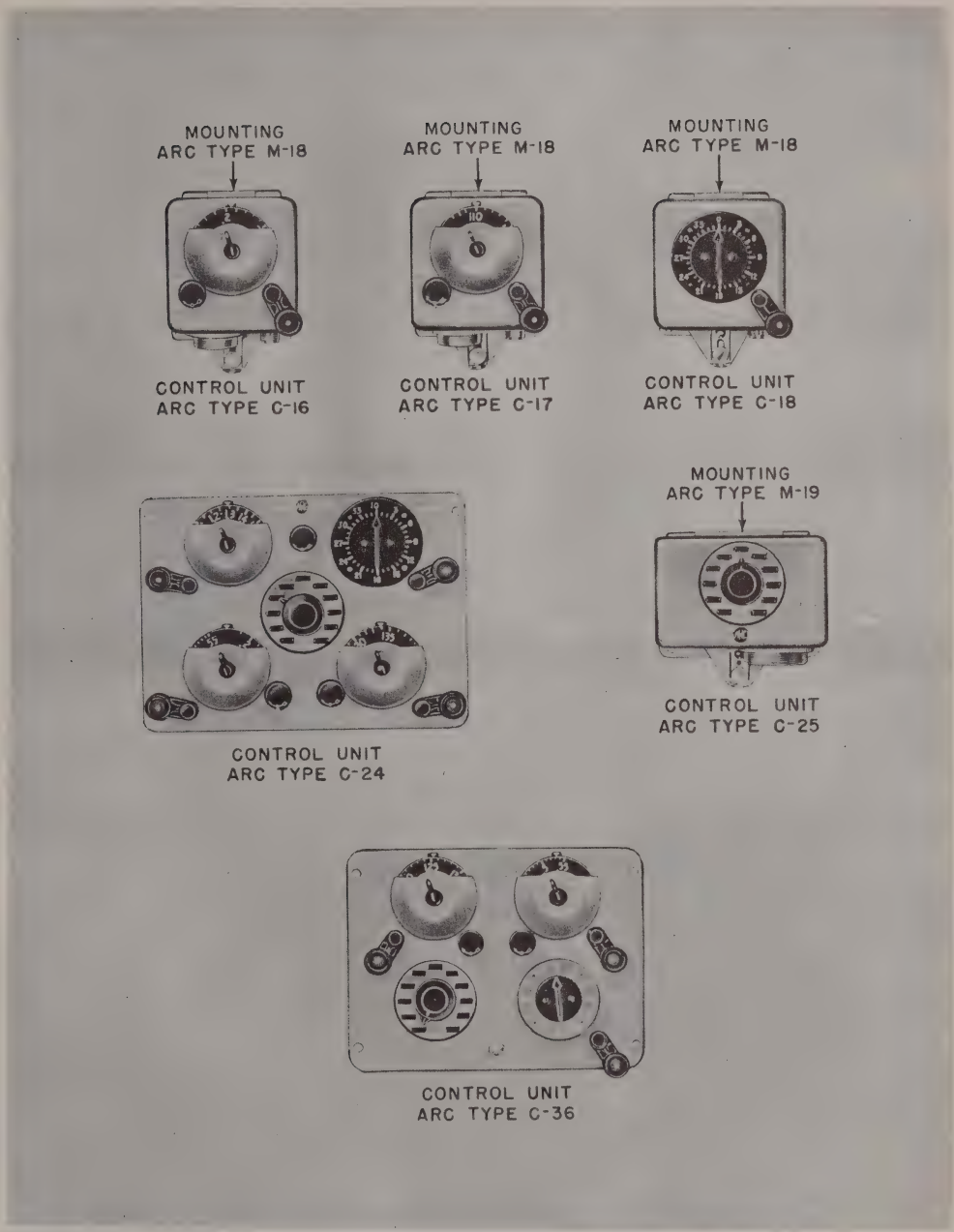


Figure 1-3. Radio Set ARC Type 12, Control Units, with Mountings (Sheet 1 of 3)

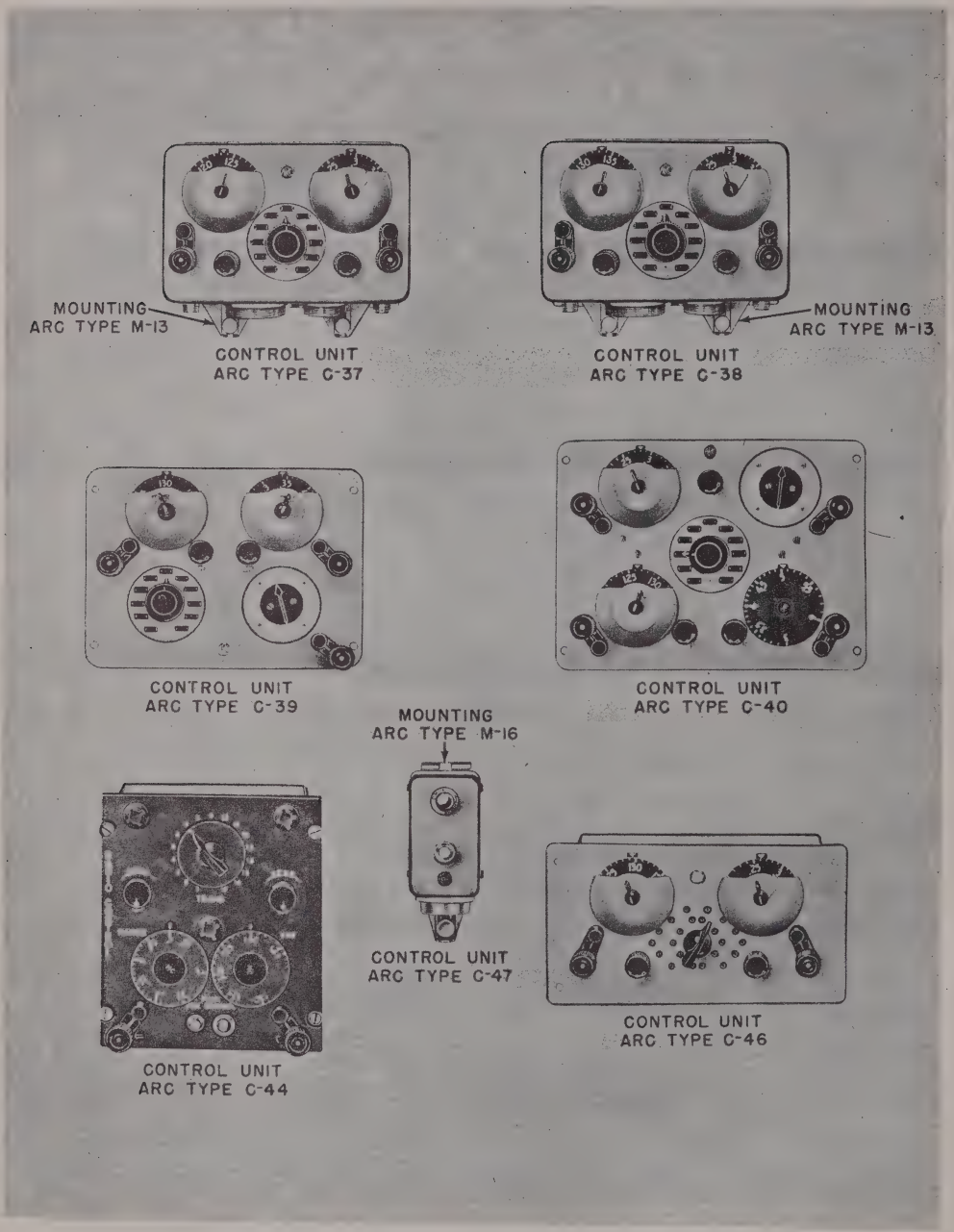


Figure 1-3. Radio Set ARC Type 12, Control Units, with Mountings (Sheet 2 of 3)

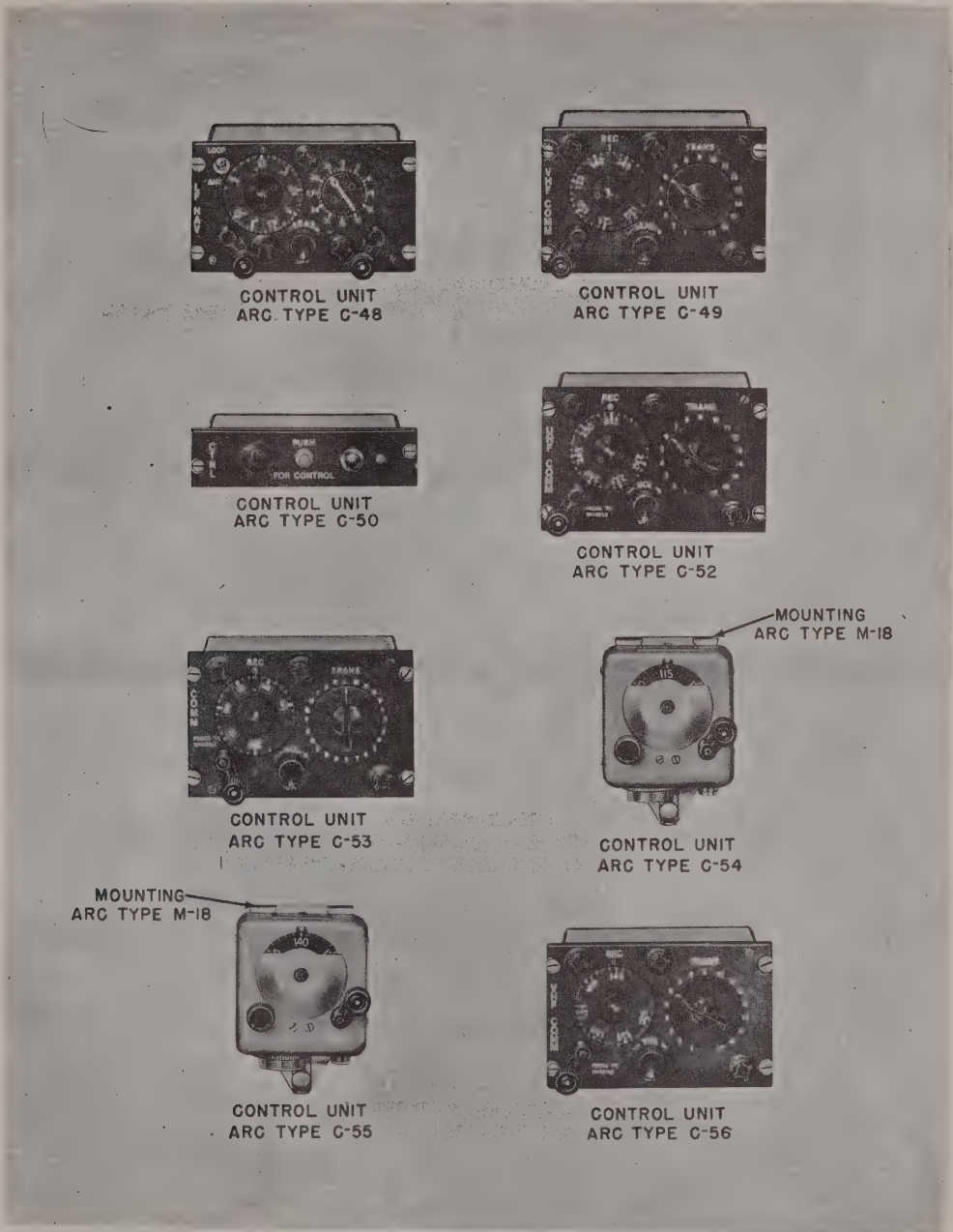


Figure 1-3. Radio Set ARC Type 12, Control Units, with Mountings (Sheet 3 of 3)

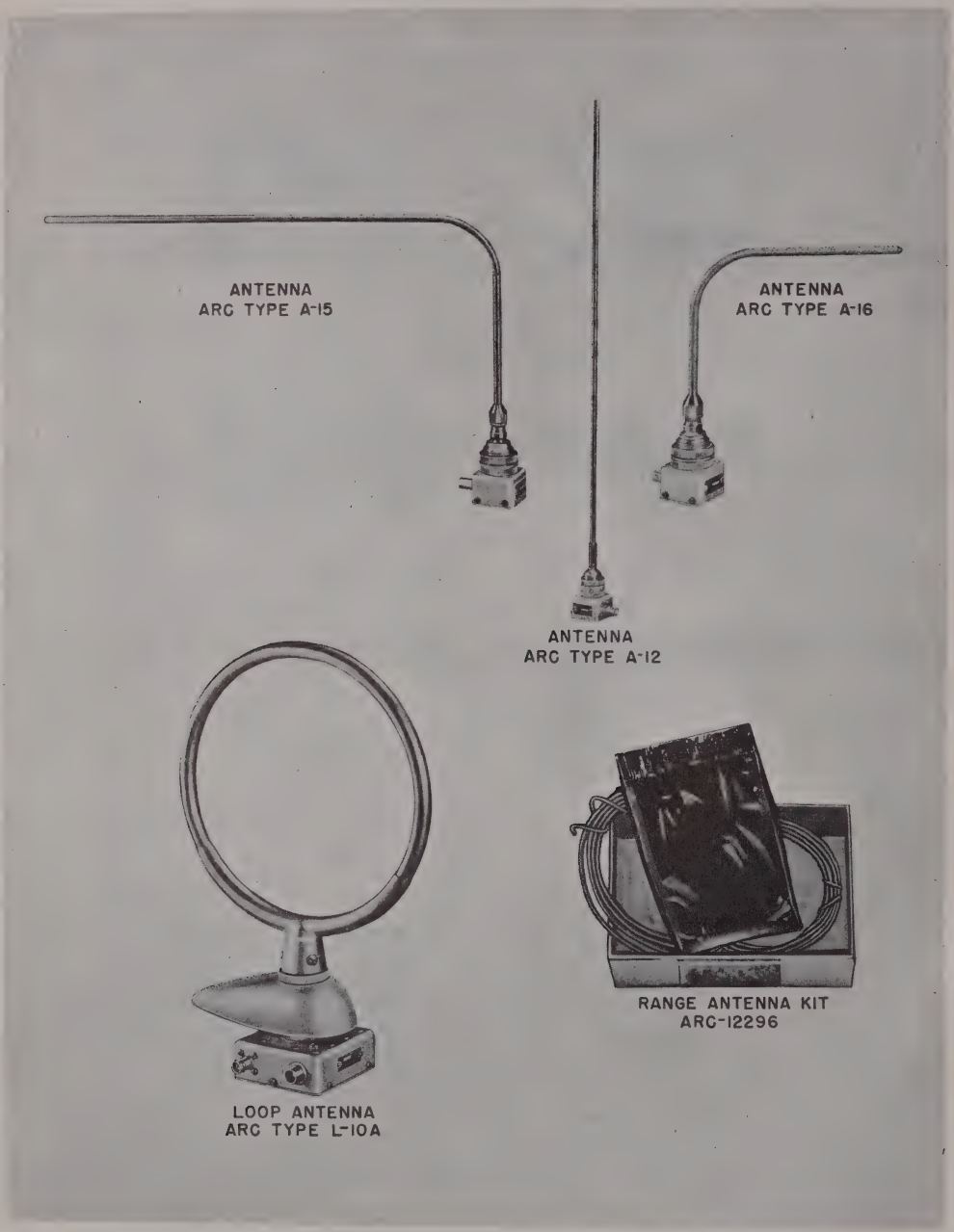


Figure 1-4. Radio Set ARC Type 12, Antennas

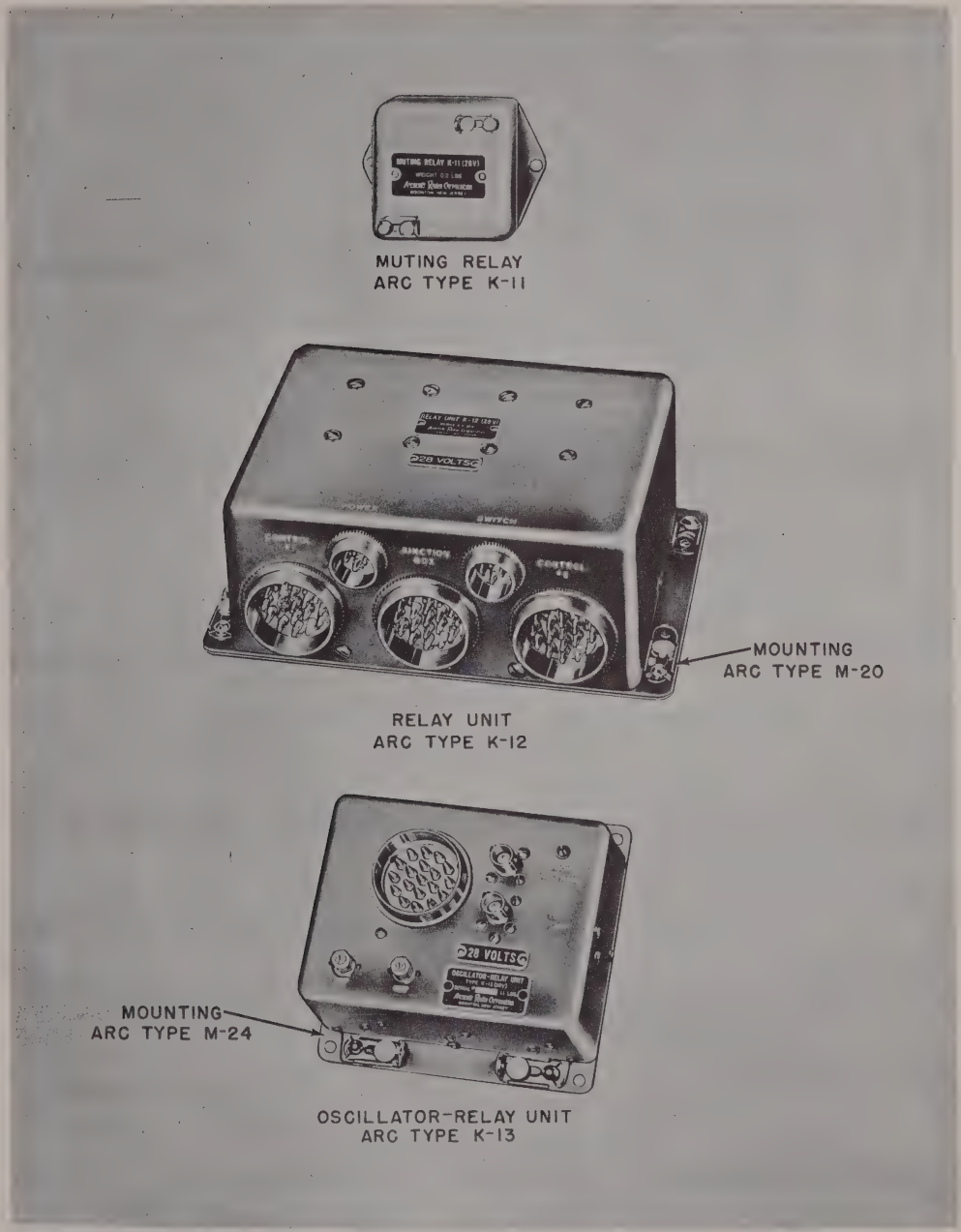


Figure 1-5. Radio Set ARC Type 12, Relay Units, with Mountings

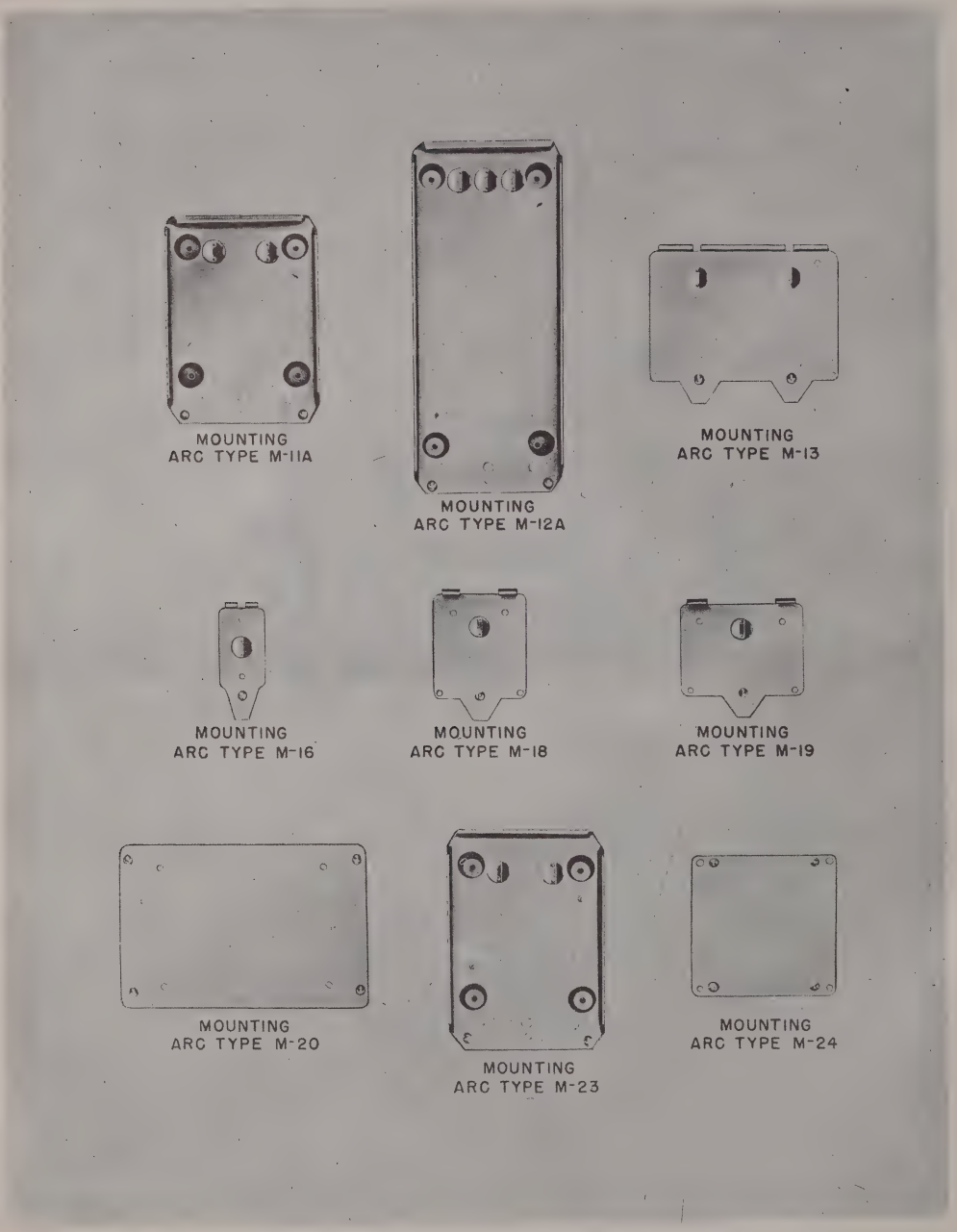


Figure 1-6. Radio Set ARC Type 12, Mountings

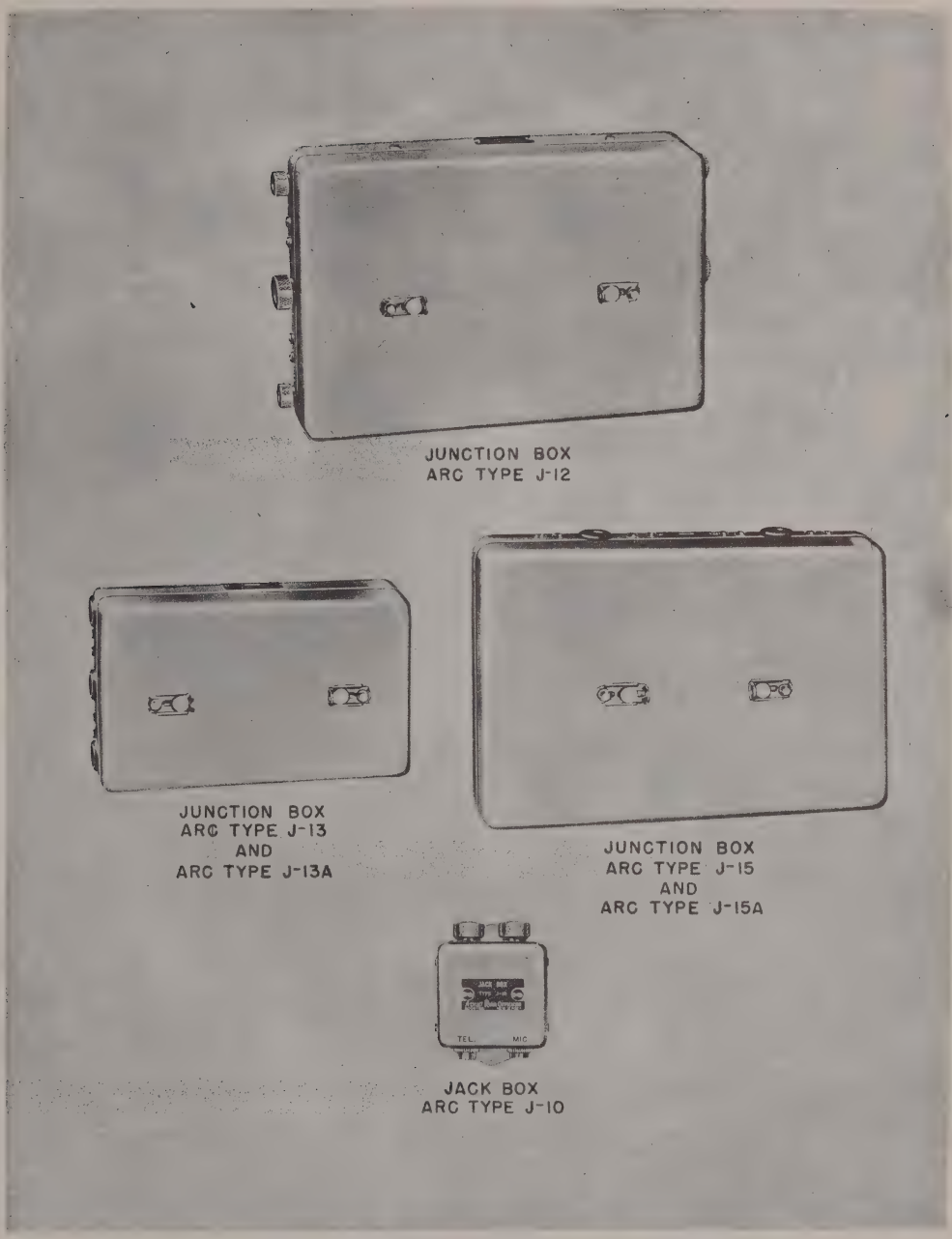


Figure 1-7. Radio Set ARC Type 12, Junction Boxes and Jack Box

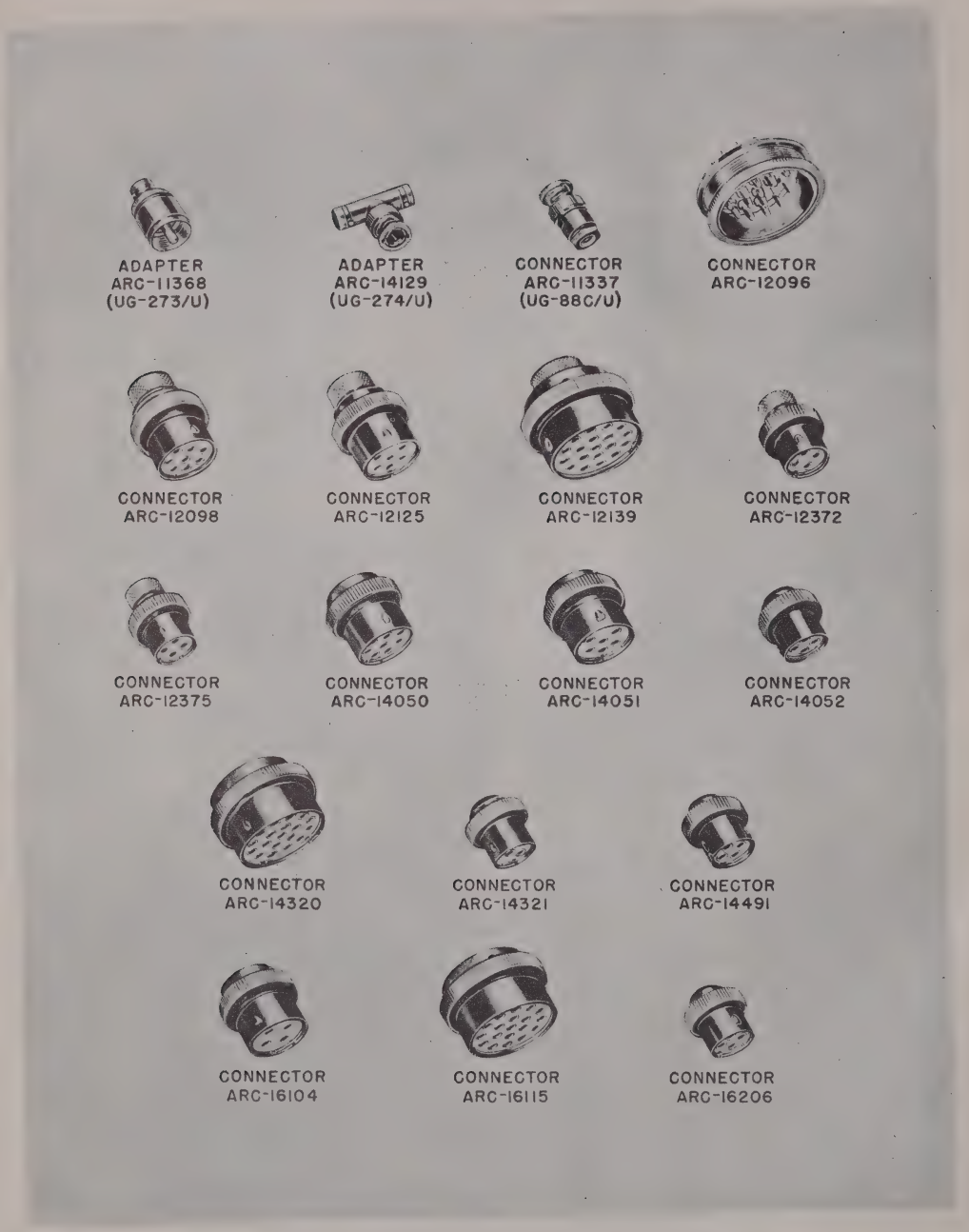
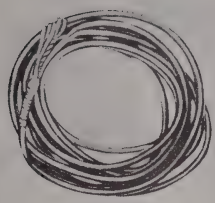
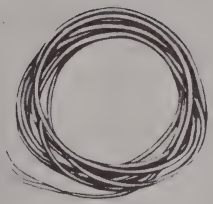


Figure 1-8. Radio Set ARC Type 12, Interconnecting Cable Parts (Sheet 1 of 2)



CABLE
ARC-11834

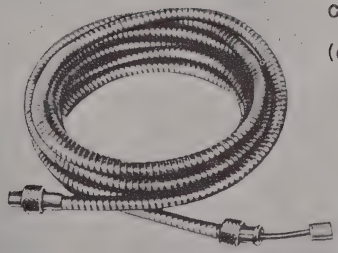
CABLE
ARC-11835



CABLE
ARC-11974

CABLE
ARC-11318
(RG-58/U)

CABLE ASSEMBLY
ARC-11369
(CG-409/U[-ft,-in.])



MECHANICAL LINKAGE
ARC-16158(MC-215) OR ARC-6151
(SEE NOTE)

NOTE: MECHANICAL LINKAGE ARC-16158 (MC-215) SUPERSEDES ARC-6151. CASING, NUT, SLEEVE SPLINE, AND SHAFTING MAY BE SUPPLIED SEPARATELY FOR FABRICATION OF MECHANICAL LINKAGE. REFER TO TABLE 1-1 FOR DETAILS.

Figure 1-8. Radio Set ARC Type 12, Interconnecting Cable Parts (Sheet 2 of 2)

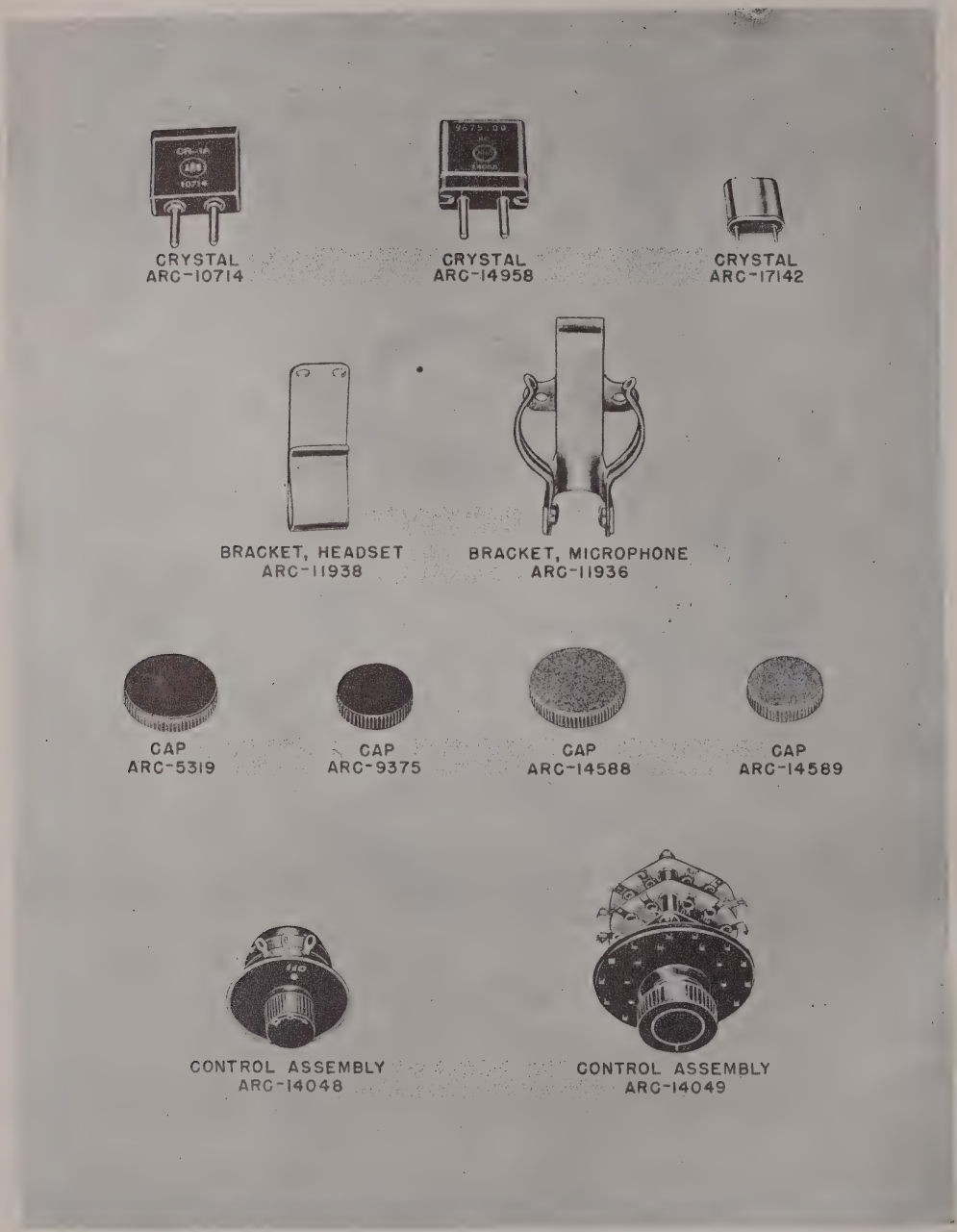


Figure 1-9. Radio Set ARC Type 12, Accessories (Sheet 1 of 3)

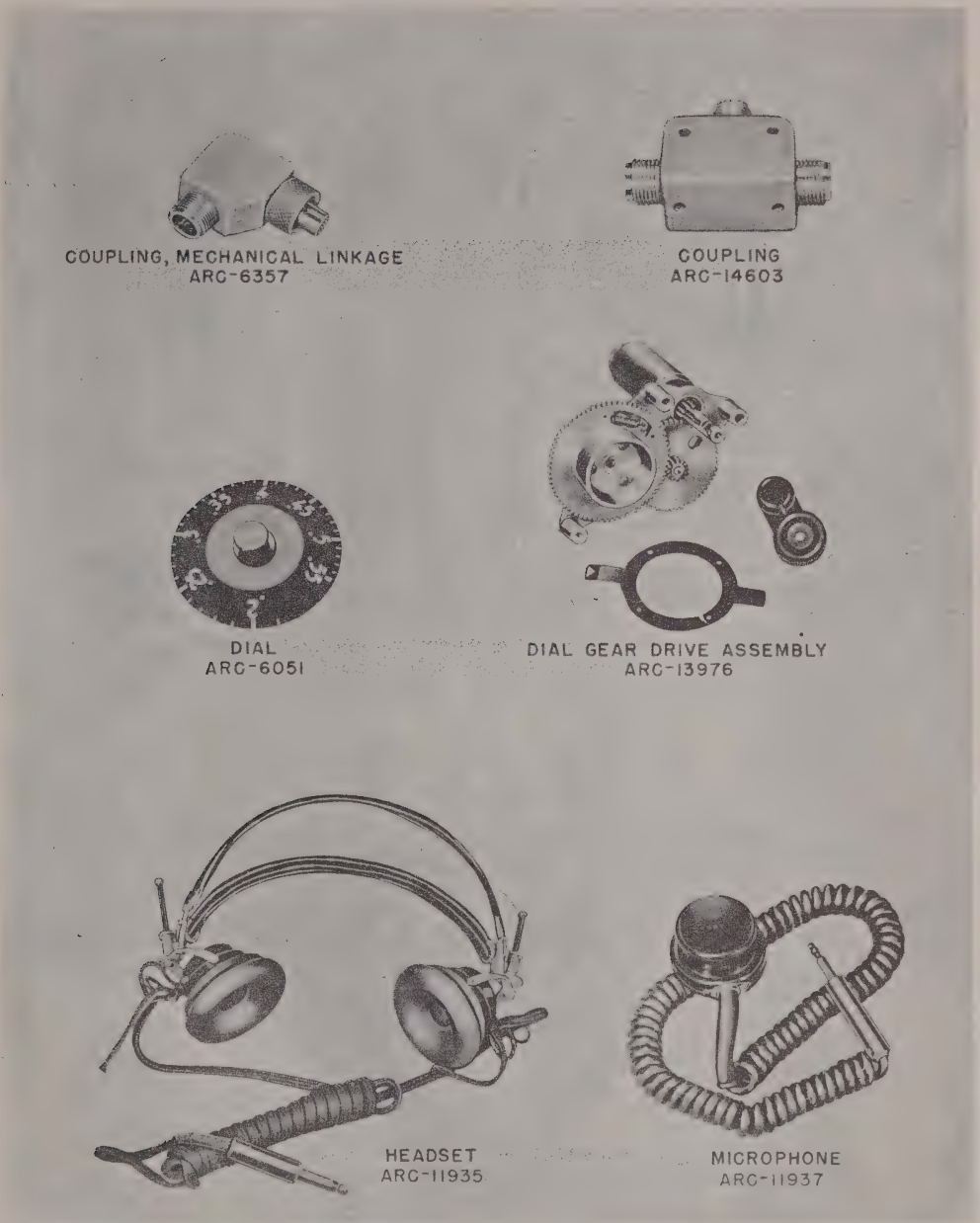


Figure 1-9. Radio Set ARC Type 12, Accessories (Sheet 2 of 3)

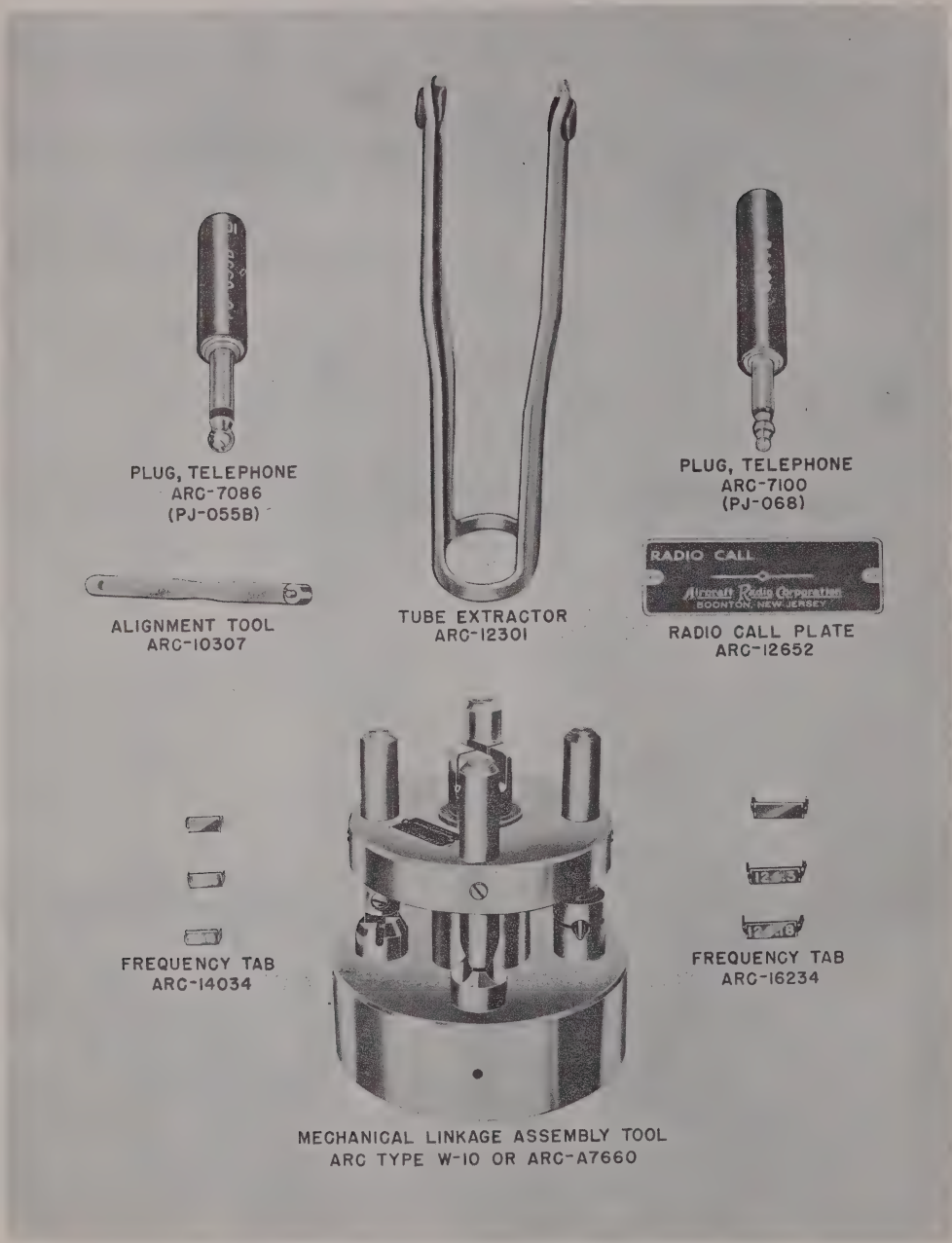


Figure 1-9. Radio Set ARC Type 12, Accessories (Sheet 3 of 3)

SECTION I

GENERAL DESCRIPTION

1-1. PURPOSE OF HANDBOOK.

1-2. This handbook provides descriptive data, operating procedures, and emergency operation and repair information for Radio Set ARC Type 12, manufactured by Aircraft Radio Corporation, Boonton, New Jersey.

1-3. PURPOSE OF EQUIPMENT.

1-4. Radio Set ARC Type 12 (see figures 1-1 through 1-9) is the nomenclature assigned to a group of radio components and accessory items, which may be used in various combinations to provide aircraft with communication and navigation facilities, suited to the individual requirements of the aircraft.

1-5. MODEL DIFFERENCES.

1-6. Components may be selected for use in aircraft equipped with either a 14-volt d-c power source or a 28-volt d-c power source. Component models designed for 14-volt operation cannot be interchanged with those designed for 28-volt operation due to electrical differences in dynamotors, relays, electron tube heater wiring, panel lamps, and other circuit details. The nameplates of noninterchangeable components indicate the required operating voltage in parentheses following the component type number; for example: R-19(14V) and R-19(28V). Components not designated in this manner may be used without regard to the primary power source rating.

1-7. Unless required, all references to components in this handbook omit the operating voltage as part of the type number; and unless noted otherwise, the information supplied in this handbook is applicable to all component models of the equipment.

1-8. EQUIPMENT SUPPLIED.

1-9. The components and accessory items which comprise Radio Set ARC Type 12 are listed by component classification in table 1-1, and are illustrated in figures 1-1 through 1-9. No quantity is specified in table 1-1, as the number and type of components will vary with the requirements of each installation. Table 1-1 includes the AN. nomenclature, which has been assigned to some components, in addition to the commercial (Aircraft Radio Corporation) type designations. However, in this handbook, all references to components will be by commercial type designations.

TABLE 1-1. EQUIPMENT SUPPLIED

Commercial Nomenclature		AN. Nomenclature	
Short Form Name	Type Designation	Short Form Name	Type Designation
RADIO RECEIVERS			
Radio Receiver	R-10A(14V)	-----	-----
Radio Receiver	R-10A(28V)	-----	-----
Radio Receiver	R-11A(14V)	Receiver, Radio	R-510/ARC
Radio Receiver	R-11A(28V)	Receiver, Radio	R-511/ARC
Radio Receiver	R-15(14V)	-----	-----
Radio Receiver	R-15(28V)	Receiver, Radio	R-509/ARC
Radio Receiver	R-19(14V)	Receiver, Radio	R-507/ARC
Radio Receiver	R-19(28V)	Receiver, Radio	R-508/ARC
Radio Receiver	R-20(14V)	-----	-----
Radio Receiver	R-20(28V)	-----	-----
DYNAMOTORS			
[1]Dynamotor	D-10(14V)	Dynamotor	DY-91/ARC
[1]Dynamotor	D-10(28V)	Dynamotor	DY-90/ARC
[1]Dynamotor	D-10A(14V)	Dynamotor	DY-89/ARC
[1]Dynamotor	D-10A(28V)	Dynamotor	DY-86/ARN-30

See footnotes at end of table.

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

Commercial Nomenclature		AN. Nomenclature	
Short Form Name	Type Designation	Short Form Name	Type Designation
RADIO TRANSMITTERS			
Radio Transmitter	T-11A(14V)	Transmitter, Radio	T-365/ARC
Radio Transmitter	T-11A(28V)	Transmitter, Radio	T-366/ARC
Radio Transmitter	T-11B(14V)	Transmitter, Radio	T-365A/ARC
Radio Transmitter	R-11B(28V)	Transmitter, Radio	T-366A/ARC
Radio Transmitter	T-13(14V)	Transmitter, Radio	T-364/ARC
Radio Transmitter	T-13(28V)	Transmitter, Radio	T-363/ARC
Radio Transmitter	T-13A(14V)	Transmitter, Radio	T-364A/ARC
Radio Transmitter	T-13A(28V)	Transmitter, Radio	T-363A/ARC
UHF Transverter	TV-10(14V)	-----	-----
UHF Transverter	TV-10(28V)	-----	-----
CONTROL UNITS			
Control Unit	C-16	Control, Receiver	C-1112/ARC
Control Unit	C-17	-----	-----
Control Unit	C-18	Control, Antenna	C-1113/ARC
Control Unit	C-24	Control, Radio Set	C-1114/ARC
Control Unit	C-25(14V)	Control, Transmitter	C-1115/ARC
Control Unit	C-25(28V)	Control, Transmitter	C-1116/ARC
Control Unit	C-36(14V)	-----	-----
Control Unit	C-36(28V)	-----	-----
Control Unit	C-37(14V)	-----	-----
Control Unit	C-37(28V)	Control, Radio Set	C-1117/ARC
Control Unit	C-38(14V)	-----	-----
Control Unit	C-38(28V)	-----	-----
Control Unit	C-39	-----	-----
Control Unit	C-40(14V)	-----	-----
Control Unit	C-40(28V)	-----	-----
Control Unit	C-44(14V)	-----	-----
Control Unit	C-44(28V)	-----	-----
Control Unit	C-46(14V)	-----	-----
Control Unit	C-46(28V)	-----	-----
Control Unit	C-47(14V)	-----	-----
Control Unit	C-47(28V)	-----	-----
Control Unit	C-48(14V)	-----	-----
Control Unit	C-48(28V)	Control, Radio Set	C-1342/ARN
Control Unit	C-49(14V)	-----	-----
Control Unit	C-49(28V)	Control, Radio Set	C-1341/ARC
Control Unit	C-50(14V)	-----	-----
Control Unit	C-50(28V)	-----	-----
Control Unit	C-52(14V)	-----	-----
Control Unit	C-52(28V)	-----	-----
Control Unit	C-53(14V)	-----	-----
Control Unit	C-53(28V)	-----	-----
Control Unit	C-54	-----	-----
Control Unit	C-55	-----	-----
Control Unit	C-56(14V)	-----	-----
Control Unit	C-56(28V)	-----	-----
ANTENNAS			
VHF Antenna	A-12	Antenna	AT-383/ARC
VHF Antenna	A-15	-----	-----
UHF Antenna	A-16	-----	-----
Loop Antenna	L-10	Antenna	AT-382/ARC
Loop Antenna	L-10A	Antenna	AT-382/ARC
Antenna Kit	ARC-12296	-----	-----

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

Commercial Nomenclature		AN. Nomenclature	
Short Form Name	Type Designation	Short Form Name	Type Designation
RELAY UNITS			
Muting Relay	K-11(14V)	-----	-----
Muting Relay	K-11(28V)	-----	-----
Relay Unit	K-12(14V)	-----	-----
Relay Unit	K-12(28V)	-----	-----
Oscillator-Relay Unit	K-13(14V)	-----	-----
Oscillator-Relay Unit	K-13(28V)	-----	-----
[2] MOUNTINGS			
[3] Mounting	M-11A	Rack, Electrical Equipment	MT-1142/ARC
[4] Mounting	M-12A	Rack, Electrical Equipment	MT-1140/ARC
Mounting	M-13	Rack, Electrical Equipment	MT-1143/ARC
Mounting	M-16	-----	-----
Mounting	M-18	-----	-----
Mounting	M-19	Rack, Electrical Equipment	MT-1141/ARC
Mounting	M-20	-----	-----
Mounting	M-23	-----	-----
Mounting	M-24	-----	-----
JUNCTION BOXES			
Junction Box	J-12(14V)	Terminal Box	J-503/ARC
Junction Box	J-12(28V)	Terminal Box	J-504/ARC
Junction Box	J-13(14V)	Terminal Box	J-505/ARC
Junction Box	J-13(28V)	Terminal Box	J-506/ARC
Junction Box	J-13A(14V)	-----	-----
Junction Box	J-13A(28V)	-----	-----
Junction Box	J-15(14V)	-----	-----
Junction Box	J-15(28V)	-----	-----
Junction Box	J-15A(14V)	-----	-----
Junction Box	J-15A(28V)	-----	-----
JACK BOX			
Jack Box	J-10	Jack Box	J-502/ARC
ADAPTERS AND CONNECTORS			
Adapter	ARC-11368	Adapter	UG-273/U
Adapter	ARC-14129	Adapter	UG-274/U
Connector	ARC-11337	Connector, Plug	UG-290A/U
Connector	ARC-12096	-----	-----
Connector	ARC-12098	-----	-----
Connector	ARC-12125	-----	-----
Connector	ARC-12139	-----	-----
Connector	ARC-12372	-----	-----
Connector	ARC-12375	-----	-----
Connector	ARC-14050	-----	-----
Connector	ARC-14051	-----	-----
Connector	ARC-14052	-----	-----
Connector	ARC-14320	-----	-----

See footnotes at end of table.

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

Commercial Nomenclature		AN. Nomenclature	
Short Form Name	Type Designation	Short Form Name	Type Designation
ADAPTERS AND CONNECTORS (Cont)			
Connector	ARC-14321	-----	-----
Connector	ARC-14491	-----	-----
Connector	ARC-16104	-----	-----
Connector	ARC-16115	-----	-----
Connector	ARC-16206	-----	-----
CABLES AND CABLE ASSEMBLIES			
Cable	ARC-11318	Cable, Radio Frequency	RG-58/U
Cable	ARC-11834	-----	-----
Cable	ARC-11835	-----	-----
Cable	ARC-11974	-----	-----
Cable Assembly	[5]ARC-11369(*)	Cable Assembly	CG-409/U(-ft-in.)
[6]MECHANICAL LINKAGE			
Mechanical Linkage consisting of:	ARC-6151	-----	-----
Shafting	ARC-1174	-----	-----
Nut	ARC-1167	-----	-----
Casing	ARC-3406	-----	-----
Sleeve	ARC-6585	-----	-----
Spline	ARC-6788	-----	-----
Mechanical Linkage consisting of:	ARC-16158	Mechanical Linkage	MC-215
Shafting	ARC-1174	-----	-----
Nut	ARC-11035	-----	-----
Casing	ARC-8601	-----	-----
Sleeve	ARC-11036	-----	-----
Spline	ARC-6788	-----	-----
QUARTZ CRYSTAL UNITS			
Crystal	ARC-10714	-----	-----
Crystal	ARC-14958	-----	-----
Crystal	ARC-17142	-----	-----
MISCELLANEOUS ACCESSORIES			
Bracket, Headset	ARC-11938	-----	-----
Bracket, Microphone	ARC-11936	-----	-----
Cap	ARC-5319	-----	-----
Cap	ARC-9375	-----	-----
Cap	ARC-14588	-----	-----
Cap	ARC-14589	-----	-----
Control Assembly	ARC-14048	-----	-----
Control Assembly	ARC-14049	-----	-----
Coupling	ARC-14603	-----	-----
Coupling, Mechanical Linkage	ARC-6357	-----	-----
Dial	ARC-6051	-----	-----
Dial Gear Drive Assembly	ARC-13976	-----	-----
Headset	ARC-11935	-----	-----
Microphone	ARC-11937	-----	-----
Plate Set	ARC-14034	-----	-----
Plate Set	ARC-16234	-----	-----
Plug, Telephone	ARC-7086	Plug, Telephone	PJ-055B
Plug, Telephone	ARC-7100	Plug, Telephone	PJ-068
Radio Call Plate	ARC-12652	-----	-----

See footnotes at end of table.

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

Commercial Nomenclature		AN. Nomenclature	
Short Form Name	Type Designation	Short Form Name	Type Designation
[7]SPECIAL TOOLS			
Alignment Tool	ARC-10307	-----	-----
Tube Extractor	ARC-12301	-----	-----
Mechanical Linkage Assembly Tool	[8] ARC Type W10 or ARC-A7660	-----	-----

1. Total quantity of dynamotors depends on quantity of radio receivers installed; one each required per radio receiver, except for R-20 receiver.
2. Refer to paragraph 1-81 and table 1-3.
3. Total quantity depends on number of vhf radio transmitters installed; one each required per transmitter.
4. Total quantity depends on number of radio receivers installed; one each required per receiver, except R-20 receiver, which uses M-23 mounting.
5. (*): Specify length in feet and inches.
6. Mechanical Linkage ARC-16158 (MC-215) supersedes ARC-6151. The linkage may be supplied assembled, or the detail parts listed may be supplied for field fabrication.
7. Required for maintenance purposes only.
8. Type W-10, used for assembly of Mechanical Linkage ARC-16158 (MC-215), supersedes ARC-A7660, used for Mechanical Linkage ARC-6151.

1-10. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

1-11. A stable, nominal 14-volt d-c or 28-volt d-c primary power source, depending on the components in use (refer to paragraph 1-6), is required for operation of the equipment. Also, depending on the intended use of the installation, if the required antennas are not supplied with the Type 12 equipment, they will have to be supplied by the using activity. Where edge-lighted plastic panel control units are installed, a separate circuit to the aircraft's panel light control is required.

1-12. EXTREME TEMPERATURE OPERATING LIMITATIONS.

1-13. COLD WEATHER OPERATION. Normal operation should be obtained under extreme cold weather conditions. Ordinarily, under such conditions, no lubrication should be applied to the shafting of the tuning mechanical linkage; however, if lubrication is considered necessary, use a very light application of clock and watch oil, Specification 14-L-16 (AER), or equivalent.

1-14. If icing conditions are anticipated, Antenna ARC Type A-12 should not be used; Antenna ARC Type A-15 may be used satisfactorily under mild icing conditions. Antenna ARC Type A-16, used for uhf transmission and reception, will operate satisfactorily under mild icing conditions.

1-15. HOT WEATHER OPERATION. Under extreme hot weather operating conditions, precautions should be taken to insure sufficient circulation of air around the equipment. Particularly for the H-13B helicopter installation, drill a sufficient number of holes, approximately 1-inch diameter, on all sides of the container in which the components are installed.

1-16. DESCRIPTION OF RADIO RECEIVERS.

1-17. RADIO RECEIVER ARC TYPE R-10A. (See figure 1-1.) Radio Receiver ARC Type R-10A is a six-tube superheterodyne, continuously tunable over the frequency range of 520-1500 kilocycles. This receiver is designed for direction-finding or homing on standard broadcast signals. The R-10A receiver uses a type 14A7 as an r-f amplifier, a 14S7 as a mixer, a 14A7 as a first i-f amplifier, a 14R7 as a second i-f amplifier and avc, a 14F7 as a detector and noise limiter, and a 12A6 as an audio amplifier. A three-section ganged capacitor is used to tune the r-f oscillator and the two tuned r-f circuits. The r-f oscillator frequency is 239 kc above the signal frequency. The r-f oscillator frequency is 239 kc above the signal frequency. The i-f stage contains six tuned circuits arranged in three pairs, each tuned to a frequency of 239 kc. The output tube delivers power in excess of 800 milliwatts, working into a nominal load of 300 ohms.

1-18. High-level automatic volume control is provided to prevent receiver overload. Since it is essential, during direction-finding procedures, to maintain the signal output at a comfortable level and out of the range of automatic control, the a-f level at which avc takes control is purposely made high. The avc circuit employs the two diode sections of V504, a type 14R7, one to produce the bias voltage, the other to delay avc action until the a-f level is sufficiently high. This delaying diode also prevents noise bursts from reducing the r-f sensitivity or causing momentary receiver

paralysis. One triode section of V505, a type 14F7, connected as a diode, is used in a noise limiter circuit which permits operation at a considerably higher static level than is normally possible. It also limits the noise level when tuning between stations.

1-19. An input of 3 amperes at 14 volts dc, or 1.5 amperes at 28 volts dc, is required for operation. High voltage is supplied by Dynamotor ARC Type D-10A, which has an output rating of 0.085 ampere at 250 volts dc. The dynamotor mounts on the rear of the receiver chassis. Electrical connections are completed through mating connectors installed on the dynamotor base and the receiver chassis. The R-10A mounts on Mounting ARC Type M-12A and may be located in any convenient location in the airplane. It has no operating controls but is designed for remote control through the use of Control Unit ARC Type C-26 (not supplied), or similar component such as the "B' CAST" control assembly included in Control Unit ARC Type C-24.

1-20. RADIO RECEIVER ARC TYPE R-11A. (See figure 1-1.) Radio Receiver ARC Type R-11A is a six-tube superheterodyne, continuously tunable over the frequency range of 190-550 kilocycles. It is designed for reception of low-frequency radio range stations and for homing or direction-finding. The intermediate frequency is 85 kilocycles. The r-f oscillator frequency is 85 kc above the signal intermediate frequency.

1-21. Except for the frequency range covered, the intermediate frequency, and certain detail part values, the R-11A receiver is similar to the R-10A receiver, which is described in paragraphs 1-17 through 1-19. The R-10A and R-11A receivers may be operated simultaneously while connected to a common fixed-wire antenna, such as Antenna Kit ARC-12296. With a common loop antenna such as Loop Antenna ARC Type L-10A, only one receiver should be connected to it at a given time for optimum results.

1-22. RADIO RECEIVER ARC TYPE R-15. (See figure 1-1.) Radio Receiver ARC Type R-15 is a nine-tube superheterodyne, continuously tunable over the frequency range of 108-135 megacycles. This receiver is designed for the reception of voice amplitude-modulated signals. The R-15 uses three type 9003 electron tubes as the first r-f amplifier, the second r-f amplifier, and the mixer, followed by a 9002 employed as the r-f oscillator. A 14A7 is used as the first i-f amplifier, a 14R7 as the second i-f amplifier and avc, another 14R7 as the third i-f amplifier and avc, and a 14F7 as the detector, noise limiter, and first a-f amplifier. A 12A6 is used as the final amplifier. A four-section ganged capacitor is used to tune the r-f oscillator and three r-f tuned circuits. The r-f oscillator frequency is 15 mc below the signal frequency. The i-f section contains eight tuned circuits arranged in four pairs, each tuned to a frequency of 15 mc.

1-23. Delayed avc is provided which allows the output to build up to approximately 170 milliwatts before taking hold. The R-15 receiver is designed for operation with Control Unit ARC Type C-17, or similar component. Such control units may have a LO-HI audio level switch to provide audio level changes of approximately 10 to 1 by the introduction of degeneration in the cathode circuit of V109, the final audio-frequency amplifier. The avc circuit employs the diode sections of V106 and V107.

1-24. One triode section of V108, a type 14F7, is incorporated in a series-diode noise-limiter circuit which provides for high attenuation of high-frequency pulses that may interfere with receiver operation.

1-25. An input of 3 amperes at 14 volts dc, or 1.5 amperes at 28 volts dc is required for operation. High voltage is supplied by Dynamotor ARC Type D-10A. The dynamotor mounts on the rear of the receiver chassis, and power connections are made through mating connectors on the base of the dynamotor and on the receiver chassis. When incorporated in a communications system which contains a vhf transmitter, such as Radio Transmitter ARC Type T-11B, the dynamotor for the R-15 receiver also supplies high voltage to the transmitter through the use of a relay in the T-11B. The R-15 mounts on Mounting ARC Type M-12A. The R-15 includes no operating controls and therefore may be located in any convenient site in the airplane; it is tuned remotely through the use of a C-17 control unit, or similar component.

1-26. RADIO RECEIVER ARC TYPE R-19. (See figure 1-1.) Radio Receiver ARC Type R-19 is a nine-tube superheterodyne, continuously tunable over the frequency range of 118-148 megacycles. This receiver is designed for the reception of voice-amplitude modulated signals. The intermediate frequency is 15 mc. Except for the frequency range covered and certain detail part values, the R-19 receiver is similar to the R-15 receiver described in paragraphs 1-22 through 1-25.

1-27. RADIO RECEIVER ARC TYPE R-20. (See figure 1-1.) Radio Receiver ARC Type R-20 is a four-tube, tuned-radio-frequency, marker-beacon receiver. It is designed for visual and aural presentation of airways 75-megacycle marker beacons modulated with either voice, or a 400-, 1300-, or 3000-cycle tone. Visual signals are provided by one white lamp (not supplied) which receives its power through relay switching in the R-20 from the aircraft's primary d-c power source. The light may be the one normally available on Indicator ID-48/ARN (not supplied), or may be an external light assembly similar to ARC-16011.

1-28. The R-20 uses two type 12AW6 electron tubes as r-f amplifiers, a 12AX7 as a detector and first audio, and a 12AT7 as a push-pull output amplifier. Six r-f tuned coupled circuits, resonated to 75 mc, plus an audio cut-off above 3000 cycles, provide excellent selectivity and reduce the possibility of spurious audio or visual reception. The r-f sensitivity for lamp operation is factory-set for 700 microvolts as measured at the antenna input connector, but it may be adjusted to any desired value between 400 and 1500 microvolts by a screwdriver-adjustable r-f sensitivity control. The R-20 has an audio output of up to 50 milliwatts into a 300-ohm load. The audio output may

be connected to the airplane's telephone system and its level controlled by an external potentiometer, normally installed for pilot control. An expansion circuit effectively narrows the cone of reception over a marker and gives sharp definition to its edges. When not over a marker, this circuit acts to squelch the receiver output.

1-29. DESCRIPTION OF RADIO TRANSMITTERS.

1-30. RADIO TRANSMITTERS ARC TYPE T-11A AND T-11B. (See figure 1-2.)

Note

Radio Transmitter ARC Type T-11B supersedes Radio Transmitter ARC Type T-11A. Functionally, the T-11A and T-11B transmitters are identical. Electrically, differences occur in the type of electron tubes used, certain detail part values, and the sidetone circuit. The numerical series of 201-299 for reference designations has been assigned to the T-11A and that of 2301-2399 to the T-11B. The following discussion refers to the detail parts of the T-11B; but, unless otherwise noted, the information supplied is also applicable to the T-11A, requiring only the substitution of the corresponding 200-series number to obtain the T-11A reference symbol. For example: For L2302, read L202 for the T-11A transmitter.

Radio Transmitter ARC Type T-11B is a four-tube, five-channel, crystal-controlled, voice amplitude-modulated transmitter, designed to permit the transmission of voice signals from aircraft to ground in any 2-megacycle band located between 116-132 megacycles. Because of the narrow band, only one set of tuned circuits is required. Four type 6AQ5 electron tubes in the T-11A, and four type 5763 electron tubes in the T-11B, are used for the crystal oscillator-doubler, amplifier-tripler, power amplifier-doubler, and modulator circuits.

1-31. The oscillator is a crystal-controlled Pierce oscillator designed to operate at 1/12 or 1/18 of the output frequency. Depending on the crystal used, the oscillator of the T-11A and the T-11B can operate as a doubler or a tripler at the 1/12 or 1/18 fundamental, respectively. The output of V2301 is tripled in the plate circuit of V2302 and finally doubled in the plate circuit of V2303. V2304, the modulator, acts as an a-f amplifier which plate-modulates the power amplifier at better than 90 percent. The unmodulated carrier output power is better than 2 watts. The microphone feeds into a 1:10 step-up microphone transformer. The modulator tube V2304 feeds into a 1:1.5 step-up transformer which feeds the r-f power amplifier and modulates its output.

1-32. The T-11B transmitter is designed for remote-control frequency selection through the use of Control Unit ARC Type C-25, or similar component. Setting the selector switch of the control unit to the desired frequency operates a relay which in turn connects the proper crystal into the oscillator circuit. When the selector switch is set to the INT position, where no crystal is installed, interphone communication is made possible through the use of a sidetone circuit. In the T-11A, this sidetone, to the headset line in the associated receiver, such as the R-15, is obtained from the plate of V204, through capacitor C201. The sidetone in the T-11B is obtained from the cathode of V2304, through capacitor C2318.

1-33. Neither the T-11A nor the T-11B contains a permanently connected meter. However, a built-in crystal detector (type 1N34, CR206 in the T-11A; type 1N34A or 1N82, CR2306 in the T-11B), with a-f bypassing is incorporated in the output circuit and provides a means of checking the tuning and modulation with an external d-c voltmeter.

1-34. An input of 1 ampere at 14 volts dc or 0.5 ampere at 28 volts dc is required for the heaters of the type 6AQ5 vacuum tubes. The requirements for the 5763 heaters are 1.5 amperes at 14 volts dc or 0.75 ampere at 28 volts dc. High voltage for the transmitter is obtained from the receiver dynamotor. The interconnections between the transmitter and receiver are arranged so that when the microphone switch is closed in preparation for transmission a single-pole double-throw relay (K2302) in the transmitter is actuated, switching the high voltage from the receiver to the transmitter. When two transmitters are installed, relays K2301 and K2302 of the transmitter not in use serve to patch the power and antenna input connections to the relays of the operating transmitter. The T-11A or the T-11B mounts on Mounting ARC Type M-11A and may be located at any convenient place in the airplane.

1-35. RADIO TRANSMITTERS ARC TYPE T-13 AND T-13A. (See figure 1-2.)

Note

Radio Transmitter ARC Type T-13A supersedes Radio Transmitter ARC Type T-13. Functionally, the T-13 and T-13A transmitters are identical. Electrically, differences occur in the type of electron tubes used, certain part values, and the sidetone circuit. The numerical series of 401-499 has been assigned to the T-13 and that of 2401-2499 to the T-13A. The following discussion refers to the detail parts of the T-13A, but, unless otherwise noted, the information supplied is also applicable to the T-13, requiring only the substitution of the corresponding 400-series number to obtain the T-13 reference symbols. For example: For L2402, read L402 for the T-13 transmitter.

Radio Transmitter ARC Type T-13A is a four-tube, five-channel, crystal-controlled, voice amplitude-modulated transmitter designed to permit the transmission of voice signals from aircraft to ground in any 2-megacycle band located between 132 and 148 mc. The frequency range can be shifted downward to cover 125-140 mc in the T-13A by the addition of a capacity plate, ARC-15900. In the T-13, a similar change can

be achieved using capacity plate ARC-15392. Each plate is equipped with sleeves of varying height which fit over the r-f tubes. The plate mounts on the modulation transformer and is secured by two studs, washers, and nuts. Four type 6AQ5 electron tubes in the T-13 and four type 5763 electron tubes in the T-13A are used for the crystal oscillator-doubler, amplifier—tripler, power amplifier—doubler, and modulator circuits.

1-36. The oscillator circuit consists of a crystal-controlled Pierce oscillator circuit designed to operate at 1/12 or 1/18 of the output frequency. Depending on the crystal used, the T-13A oscillator can operate as a doubler or tripler at the 1/12 or the 1/18 fundamental, respectively. The output of V2401 is tripled in the plate circuit of V2402 and finally doubled in the plate circuit of V2403.

1-37. High voltage for the T-13A is obtained from Dynamotor ARC Type D-10A mounted on the associated receiver of the system. Except for the frequency range covered, certain detail part values, and other differences noted in paragraphs 1-35 and 1-36, the T-13 transmitter is similar to the T-11A transmitter, and the T-13B to the T-11B. For further details refer to paragraphs 1-30 through 1-34.

1-38. UHF TRANSVERTER ARC TYPE TV-10. (See figure 1-2.) UHF Transverter ARC Type TV-10 is a combined uhf transmitter and a receiver converter. The transmitter portion functions as an independent transmitter on a frequency range of 228 to 258 mc; it does not require the use of any vhf component for transmission. The converter section converts received signals in the range of 228-258 mc to 118-148 mc, after mixing with a 110-mc crystal oscillator, and requires the use of an R-19 vhf receiver for reception. High voltage for all TV-10 circuits is supplied by the dynamotor mounted on the R-19 receiver.

1-39. The transmitter is a five-tube, eight-channel, crystal-controlled, voice amplitude-modulated circuit designed for aircraft-to-ground transmission in the frequency range of 228 to 258 mc. Four type 5763 and one type 6201 electron tubes are used. One of the 5763 tubes is used as a crystal oscillator-doubler, two as amplifier-doublers, and the remaining one as a modulator. The triode sections of the 6201 function as a push-pull amplifier-tripler. The eight transmitting channels may all be located in one 4-megacycle band or they may be divided between two bands, each 4 megacycles wide with at least a 2-megacycle separation. The power output is rated at 0.5 watt. At an altitude of 5000 feet, the transmitting distance range is approximately 60 miles. A type 1N82 crystal detector, with a-f bypassing, is used to provide a means of checking the tuning and modulation with an external d-c voltmeter.

1-40. The converter section of the TV-10 comprises a 228-258 mc uhf preselector, a 110-mc crystal oscillator using a type 6201 electron tube, a crystal diode mixer, and a 118-148 mc vhf matching network. Incoming signals between 228 and 258 megacycles, after being mixed with the 110-mc crystal oscillator frequency, are converted to 118- to 148-megacycle signals. The converted signal is fed to the R-19 receiver, which is tunable from 118 to 148 megacycles. The converter portion of the TV-10 contains a 228-258 megacycle band-pass network between the uhf antenna connection and a 1N82 crystal mixer. The output from the crystal mixer feeds into the 118-148 mc vhf matching network, whose output feeds into the R-19 receiver input.

1-41. The TV-10, as a component of a uhf Type 12 system, is controlled by Control Unit ARC Type C-52 or equivalent (refer to paragraph 1-63); or as part of a vhf/uhf system, it is controlled by Control Unit ARC Type C-53, or equivalent (refer to paragraph 1-65).

1-42. DESCRIPTION OF DYNAMOTORS.

1-43. DYNAMOTORS ARC TYPES D-10 AND D-10A. (See figure 1-1.)

Note

The D-10A dynamotor supersedes the D-10 dynamotor, which was supplied with early deliveries of certain receivers. D-10 dynamotors and replacement parts thereof are no longer available from the contractor or manufacturer. When the present stock of D-10 dynamotors is exhausted, replace with D-10A.

The D-10 and D-10A dynamotors are completely enclosed and sealed units designed to furnish high voltage to the individual receivers on which they are mounted, and to associated components, such as a vhf transmitter, marker-beacon receiver, or uhf transmitter, included in the system. The dynamotors mount by means of snapslides onto four shock mounts which are an integral part of the receiver chassis. Electrical connections are made through a connector on the dynamotor base which mates with a connector on the receiver chassis. The D-10 dynamotor has a rated input of 2.8 amperes at 14 volts dc or 1.4 amperes at 28 volts dc, and a rated output of 0.06 ampere at 250 volts dc. The D-10A dynamotor has a rated input of 3.4 amperes at 14 volts dc and 1.7 amperes at 28 volts dc, and a rated output of 0.085 ampere at 250 volts dc.

1-44. DESCRIPTION OF CONTROL UNITS.

1-45. GENERAL. Table 1-2 summarizes the types and functions of Type 12 control units, and the mounting types, if any, required for installation. An asterisk enclosed in parentheses (*) following a type number indicates that the unit is available in either a 14-volt or 28-volt model. (Refer to paragraph 1-6.) Paragraphs 1-46 through 1-68 describe the functional, electrical, and physical characteristics of the control units.

TABLE 1-2. CONTROL UNITS OF RADIO SET ARC TYPE 12

CONTROL UNIT			[1] MOUNTING REQUIRED		
ARC TYPE NO.	AN. TYPE NO.	COMPONENT(S) CONTROLLED	TYPE	ARC TYPE NO.	AN. TYPE NO.
C-16	C-1112/ARC	R-11A receiver	Base	M-18	-----
C-17	-----	R-15 receiver	Base	M-18	-----
C-18	C-1113/ARC	L-10 or L-10A loop antenna	Base	M-18	-----
C-24	C-1114/ARC	R-10A, R-11A, and R-15 receivers; two Type 12 transmitters; L-10 or L-10A loop antenna	Base	-----	-----
C-25(14V) C-25(28V)	C-1115/ARC C-1116/ARC	Two Type 12 transmitters; AFM transmitter (not part of Type 12)	Base	M-19	MT-1141/ARC
C-36(*)	-----	R-11A and R-19 receivers; two Type 12 transmitters; L-10 or L-10A loop antenna; FM transmitter (not part of Type 12)	Panel	-----	-----
C-37(*)	C-1117/ARC	R-11A and R-19 receivers; two Type 12 transmitters; FM transmitter (not part of Type 12)	Base	M-13	MT-1143/ARC
C-38(*)	-----	R-11A and R-15 receivers; two Type 12 transmitters; FM transmitter (not part of Type 12)	Base	M-13	MT-1143/ARC
C-39	-----	R-11A and R-19 receivers; two Type 12 transmitters; L-10 or L-10A loop antenna	Panel	-----	-----
C-40	-----	[2] R-11A and R-19 receivers; AN/ARC-5 receiver (not part of Type 12); two AN/ARC-5 transmitters and FM transmitter (not part of Type 12); L-10 or L-10A loop antenna	Panel	-----	-----
C-44	-----	R-11A and R-19 receivers; three Type 12 transmitters; K-12 relay unit	Console	-----	-----
C-46	-----	R-11A and R-19 receivers; two Type 12 transmitters; FM transmitter (not part of Type 12)	Panel	-----	-----
C-47(*)	-----	K-12 relay unit	Base	M-16	-----
C-48(14V) C-48(28V)	----- C-1342/ARN	R-11A receiver; L-10 or L-10A loop antenna	Console	-----	-----
C-49(14V) C-49(28V)	----- C-1341/ARC	R-19 receiver; three Type 12 transmitters	Console	-----	-----

See footnotes at end of table.

TABLE 1-2. CONTROL UNITS OF RADIO SET ARC TYPE 12 (Cont)

CONTROL UNIT			MOUNTING REQUIRED		
ARC TYPE NO.	AN. TYPE NO.	COMPONENT(S) CONTROLLED	TYPE	ARC TYPE NO.	AN. TYPE NO.
C-50(*)	-----	K-12 relay unit	Console	-----	-----
C-52(*)		[3] R-19 receiver; two TV-10 transverters; K-13 oscillator-relay unit	Console	-----	-----
C-53(*)		[4] R-19 receiver; three Type 12 transmitters; one TV-10 transverter; K-13 oscillator-relay unit	Console	-----	-----
C-54	-----	R-15 receiver; K-13 oscillator-relay unit	Base	M-18	-----
C-55	-----	R-19 receiver; K-13 oscillator-relay unit	Base	M-18	-----
C-56(*)	-----	R-19 receiver; three Type 12 transmitters; K-13 oscillator-relay unit	Console	-----	-----

1. For base mounting, the unit is secured to a separate mounting by snapslides. For panel mounting, the unit is secured to a mounting surface by mounting holes in the control unit panel. For console mounting, the unit is secured to a standard AN. console framework.
2. AN/ARC-5 receiver frequency dial is removable.
3. Receiver dial calibrated for uhf frequencies only.
4. Receiver dial calibrated for both vhf and uhf frequencies.

1-46. CONTROL UNIT ARC TYPE C-16. (See figure 1-3.) Control Unit ARC Type C-16 provides for remote control of an R-11A receiver. The controls provided include a combined switch-potentiometer to control the application of primary power and to adjust the level of the receiver's r-f sensitivity, a two-position switch to select either a loop antenna or a fixed wire antenna, and a crank for tuning the receiver to the desired frequency. The C-16 requires Mounting ARC Type M-18 for installation.

1-47. CONTROL UNIT ARC TYPE C-17. (See figure 1-3.) Control Unit ARC Type C-17 provides for remote control of an R-15 receiver. The controls provided include a combined switch-potentiometer to control the application of primary power and to adjust the level of the receiver's r-f sensitivity, a two-position switch to select either HI or LO audio level reception, and a crank for tuning the receiver to the desired frequency. The C-17 requires Mounting ARC Type M-18 for installation.

1-48. CONTROL UNIT ARC TYPE C-18. (See figure 1-3.) Control Unit ARC Type C-18 provides for remote control of the orientation of the L-10 or L-10A loop antenna through the use of a crank and a dial. The dial is calibrated to indicate rotation of the loop antenna from 0 to 360 degrees. The C-18 is designed for base mounting by means of Mounting ARC Type M-18.

1-49. CONTROL UNIT ARC TYPE C-24. (See figure 1-3.) Control Unit ARC Type C-24 is a panel-mounted unit designed for remote control of one R-10A receiver, one R-11A receiver, one R-15 receiver, one or two Type 12 vhf transmitters, and one L-10 or L-10A loop antenna. Essentially, it incorporates in one unit the control functions of the C-16, C-17, C-18, and C-25 control units, with an added control for the R-10A receiver. (Refer to paragraphs 1-46, 1-47, 1-48, and 1-50.) The transmitter channels are designated by removable frequency tabs. All electrical and mechanical input and output connections are made at the rear of the enclosure through suitable connectors.

1-50. CONTROL UNIT ARC TYPE C-25. (See figure 1-3.) Control Unit ARC Type C-25 is designed for frequency selection control of one or two Type 12 vhf transmitters and an FM transmitter, such as a type SCR-619. The C-25 control unit includes a sidetone relay to permit interphone communication when switched to the INT position. When switched to the FM position, the C-25 functions to disconnect the microphone and key connections from the transmitter(s) and connect them to the appropriate circuits of the FM transmitter. Because of the relay, the C-25 is supplied for either 14-volt d-c or 28-volt d-c operation, depending on the input voltage rating of the equipment with which it is used. Frequency channels are designated by means of removable tabs. This control unit is designed for base mounting by means of Mounting ARC Type M-19.

1-51. CONTROL UNIT ARC TYPE C-36. (See figure 1-3.) Control Unit ARC Type C-36 is designed for remote control of one R-19 receiver, one R-11A receiver, one or two Type 12 vhf transmitters, an FM transmitter, and one L-10 or L-10A loop antenna. A relay is included to permit the connection of the microphone and key circuits to the FM transmitter, such as the SCR-619, when the microphone switch is closed and the TRANS control is set to FM. Individual combined primary power-sensitivity controls, tuning cranks, and frequency indicating dials are provided for the receivers. The transmitters' frequency selector control is similar to that used in the C-25 control unit (refer to paragraph 1-50). The C-36 is designed for panel mounting. All electrical and mechanical connections are made at the rear of the enclosure through suitable connectors.

1-52. CONTROL UNIT ARC TYPE C-37. (See figure 1-3.) Control Unit ARC Type C-37 is designed for remote control of one R-11A receiver, one R-19 receiver, one or two Type 12 vhf transmitters, and an FM transmitter, such as the SCR-619. Individual combined primary power-sensitivity controls, tuning cranks, and frequency indicating dials are provided for the receivers. A transmitter frequency selector control similar to the C-25 control unit (refer to paragraph 1-50) is included. The C-37 is available in either a 14-volt or a 28-volt model.

1-53. The C-37 control unit is equipped with a relay to disconnect the microphone and key circuits from the Type 12 vhf transmitters and connect them to the FM transmitter. The transmitters' frequency channels, the interphone connection, and the FM connection are designated by removable frequency tabs. All electrical and mechanical input and output connections are made through the bottom side of the enclosure. The C-37 is designed for base mounting by means of Mounting ARC Type M-13.

1-54. CONTROL UNIT ARC TYPE C-38. (See figure 1-3.) With one exception, Control Unit ARC Type C-38 is identical with the C-37 control unit. The VHF dial of the C-38 is calibrated for use with an R-15 receiver instead of an R-19 receiver, as in the C-37. For further details refer to paragraphs 1-52 and 1-53.

1-55. CONTROL UNIT ARC TYPE C-39. (See figure 1-3.) Control Unit ARC Type C-39 is designed for remote control of one R-19 receiver, one R-11A receiver, one or two Type 12 vhf transmitters, and one L-10 or L-10A loop antenna. Individual combined primary power-sensitivity controls, tuning cranks, and frequency indicating dials are provided for the receivers. The transmitter frequency selector control is similar to the C-25 control unit (refer to paragraph 1-50). The C-39 is designed for panel mounting. All electrical and mechanical connections are made through the rear of the enclosure.

1-56. CONTROL UNIT ARC TYPE C-40. (See figure 1-3.) Control Unit ARC Type C-40 is designed for remote control of one R-19 receiver, one R-11A receiver, one L-10 or L-10A loop antenna, components of Model AN/ARC-5 Aircraft Radio Equipment (not part of Type 12 equipment), and an FM transmitter, such as Model SCR-619 (not part of Type 12 equipment) where such equipment is installed in the aircraft. Individual combined primary power-sensitivity controls, tuning cranks, and frequency indicating dials are supplied for the Type 12 R-11A and R-19 receivers. In addition, a combined primary sensitivity control and a tuning mechanism, supplied without a frequency indicating dial, is incorporated to permit remote-control tuning of the AN/ARC-5 receiver, or similar component. The required frequency dial (supplied by the using activity) is attached to the front panel of the control unit. A three-section selector switch is included. This switch simultaneously applies primary power to the transmitter, selects the frequency channel, and connects the appropriate transmitter for the frequency channel selected. The C-40 control unit is designed for panel mounting. All electrical and mechanical connections are made at the rear of the enclosure through suitable connectors.

1-57. CONTROL UNIT ARC TYPE C-44. (See figure 1-3.) Control Unit ARC Type C-44 is an edge-lighted plastic panel, AN, console-mounted component designed to control one R-11A receiver, one R-19 receiver, a K-12 relay unit and up to three Type 12 vhf transmitters, in a dual-control radio communication system. Individual combined primary power-sensitivity controls, tuning cranks, and frequency indicating dials are provided for the receivers. Transmitter crystal frequency selection, and the interphone connection, is made by means of the TRANS switch control. In a dual-control system, where the controls are duplicated, either operator may take control and operate the system by means of a K-12 relay unit, which is controlled by the non-locking push-button switch marked PUSH FOR CONTROL. When the control is effective, the red-lens light assembly on the front panel of the controlling operator's unit lights. Edge-lighting panel illumination is provided by three midget flange-base lamps of the required rating (14 or 28 volts) installed in MS25010-2 red filter light assemblies, and is controlled by the aircraft's panel-lamp control. Electrical connections and mechanical linkage tuning connections are made at the rear of the control unit.

1-58. CONTROL UNIT ARC TYPE C-46. (See figure 1-3.) Control Unit ARC Type C-46, a control unit intended for panel mounting, is designed to perform the same functions as Control Unit ARC Type C-37 (refer to paragraphs 1-52 and 1-53). In addition to the difference in mounting requirements, the C-46 differs from the C-37 as to the location of electrical connectors and mechanical linkage tuning connections, and the method of attaching the crystal frequency tabs around the TRANS switch on the front panel.

1-59. CONTROL UNIT ARC TYPE C-47. (See figure 1-3.) Control Unit ARC Type C-47 is intended for installation in a dual-control radio communication system to permit electrical control of the system to be transferred from one operator to the other. System control is transferred by means of the K-12 relay unit, which is controlled by the PUSH FOR CONTROL non-locking push-button switch. A red-lens indicating lamp lights when control has been transferred to the operator closing the switch. The C-47 requires Mounting ARC Type M-16 for installation.

1-60. CONTROL UNIT ARC TYPE C-48. (See figure 1-3.) Control Unit ARC Type C-48 is an edge-lighted plastic panel, AN. console-mounted component designed to control one R-11A receiver and one L-10 or L-10A loop antenna. The controls consist of a tuning crank for tuning the R-11A to the desired frequency, a combined SENS-OFF control to control the application of primary power and to adjust the level of the receiver's sensitivity, a LOOP-ANT. toggle switch for selecting either a fixed-wire antenna or loop antenna for reception, and a tuning crank for controlling the orientation of the loop antenna, as indicated on the associated dial. Edge-lighting panel illumination is provided by three midget flange-base lamps of the required rating (14 or 28 volts) installed in MS25010-2 red-filter light assemblies, and is controlled by the aircraft's panel-lamp control. Electrical connections and mechanical linkage tuning connections are made at the rear of the unit.

1-61. CONTROL UNIT ARC TYPE C-49. (See figure 1-3.) Control Unit ARC Type C-49 is an edge-lighted plastic panel, AN. console-mounted component designed to control one R-19 receiver and up to three Type 12 vhf transmitters. The controls consist of a combined SENS-OFF control to control the application of primary power and to adjust the level of the receiver's r-f sensitivity, a TRANS rotary switch for transmitter crystal frequency and interphone connection, and a tuning crank for tuning the receiver to the desired frequency, as indicated on the associated dial marked MC. Edge-lighting panel illumination is provided by three midget flange-base lamps of the required rating (14 or 28 volts) installed in MS25010-2 red-filter light assemblies, and is controlled by the aircraft's panel-lamp control. Electrical connections and mechanical linkage tuning connections are made at the rear of the unit.

1-62. CONTROL UNIT ARC TYPE C-50. (See figure 1-3.) Control Unit ARC Type C-50, an edge-lighted plastic panel, AN. console-mounted component, is intended for installation in a dual-control radio communication system to permit electrical control of the system to be transferred from one operator to the other. System control is transferred by means of the K-12 relay unit, which is operated by the non-locking, push-button PUSH FOR CONTROL switch. A red-lens indicating lamp, located on the front panel, lights when the control is effective.

1-63. CONTROL UNIT ARC TYPE C-52. (See figure 1-3.) Control Unit ARC Type C-52 is an edge-lighted plastic panel, AN. console-mounted unit designed to control one R-19 receiver for uhf reception only, one K-13 oscillator-relay, and one or two TV-10 transverters. The frequency dial, marked MC, is calibrated for use in the uhf band of 228 to 258 mc. The controls comprise a combined VOL-OFF control to control the application of primary power and to adjust the audio level of the receiver output, a TRANS selector switch for interphone connection and selection of up to 16 uhf transmitting channels, and a combined receiver tuning control and "whistle-through" control to operate the K-13. Edge-lighted panel illumination is provided by three midget flange-base lamps of the required rating (14 or 28 volts) installed in MS25010-2 red-filter light assemblies, and is controlled by the aircraft's panel-lamp control. Electrical connections and mechanical linkage connections are made at the rear of the unit.

1-64. CONTROL UNIT ARC TYPE C-53. (See figure 1-3.) Control Unit ARC Type C-53 is an edge-lighted plastic panel, AN. console-mounted component designed to control one R-19 receiver for vhf or uhf reception, up to three Type 12 vhf transmitters, one K-13 oscillator-relay, and one TV-10 transverter. The frequency dial is calibrated for both a vhf band of 118 to 148 mc and a uhf band of 228 to 258 mc. Provisions are made so that only one band will be visible at a time. The controls consist of a combined VOL-OFF control to control the application of primary power and to adjust the audio level of the receiver output; a TRANS selector switch for selection of up to 15 vhf frequency channels, interphone, and eight uhf channels; and a combined receiver tuning and "whistle-through" control. Edge-lighting for panel illumination is provided by three midget flange-base lamps of the required rating (14 or 28 volts) installed in MS25010-2 red-filter light assemblies, and is controlled by the aircraft's panel-lamp control.

1-65. When the TRANS switch is changed from the vhf band position (alphabetical positions) to the uhf band (numerical positions), the frequency indicating dial shifts to expose the uhf frequencies; the uhf transmitter circuit of the TV-10 is ready for operation; the uhf receiver-converter circuit of the TV-10 is turned on and connected to the R-19 receiver input; and the A-16 uhf antenna replaces the A-15 vhf antenna.

1-66. CONTROL UNIT ARC TYPE C-54. (See figure 1-3.) Control Unit ARC Type C-54 is designed to control an R-15 receiver. The controls consist of an OFF control to control the application of primary power and to adjust the audio level of the receiver output, and a combined receiver tuning and "whistle-through" control which is used, in conjunction with a K-13 oscillator relay, to tune the receiver precisely to a vhf transmitter crystal frequency. The C-54 is intended for base installation using Mounting ARC Type M-18.

1-67. CONTROL UNIT ARC TYPE C-55. (See figure 1-3.) Except for its intended use to control an R-19 receiver, requiring a different frequency dial, the C-55 is identical to the C-54 control unit described in paragraph 1-66.

1-68. CONTROL UNIT ARC TYPE C-56. (See figure 1-3.) Control Unit ARC Type C-56 is an edge-lighted plastic panel, AN. console-mounted component designed to control one R-19 receiver, one K-13 oscillator-relay, and up to three Type 12 vhf transmitters. The controls consist of: a combined VOL-OFF control to control the application of primary power and to adjust the audio level of the receiver output; a TRANS selector switch for interphone connection and selection of up to 16 vhf transmitting channels; and a combined receiver tuning and "whistle-through" control, which permits precise tuning of the receiver to a transmitter crystal frequency when used with a K-13 oscillator-relay. Edge-lighted panel illumination is provided

by three midget flange-base lamps of the required rating (14 or 28 volts) installed in MS25010-2 red-filter light assemblies, and is controlled by the aircraft's panel-lamp control. Electrical connections and mechanical linkage connections are made at the rear of the unit.

1-69. DESCRIPTION OF ANTENNAS.

1-70. ANTENNA ARC TYPE A-12. (See figure 1-4.) Antenna ARC Type A-12 is a vhf, 25-inch, quarter-wave, base-fed antenna, requiring only a single-hole mounting. The mast section is easily removable by unscrewing it from the base, thus facilitating replacement. The A-12 is designed for use with the R-15 receiver or T-11B transmitter, or similar components. The A-12 antenna is meant for use on aircraft which have cruising speeds up to 200 mph and which do not have de-icing equipment. Where all-weather flying is indicated, a Type AN-104B antenna should be substituted. If an AN-104B is used, an adapter (ARC-11368) is required for connection from the antenna cable's BNC connector to the antenna's uhf connector. The base of the A-12 includes a UG-290/U connector for connecting the transmission line, such as RG-58/U coaxial cable.

1-71. ANTENNA ARC TYPE A-15. (See figure 1-4.) Antenna ARC Type A-15 is a vhf, quarter-wave, base-fed, inverted-L antenna. It consists of a solid stainless steel, L-shaped rod, flexibly mounted in rubber to a small aluminum box. The flexible mounting increases the reliability of operation under mild icing conditions, and also allows for movement of the antenna, which minimizes the possibility of damaging the antenna if it should come in contact with obstacles on the ground. The aluminum box is the coupling box and contains an impedance matching network and a UG-290A/U connector for connecting the transmission line, such as RG-58/U coaxial cable. Though primarily intended for under-fuselage mounting, the A-15 may also be mounted on top. The voltage standing wave ratio (vswr) is less than 3:1 in the frequency range of 116-148 mc.

1-72. ANTENNA ARC TYPE A-16. (See figure 1-4.) Antenna ARC Type A-16 is a quarter-wave, base-fed, inverted-L antenna designed to operate in the uhf band. It consists of a stainless steel, L-shaped rod, mounted on a small aluminum box. The box contains a broad-banding circuit and a UG-290A/U connector for connecting the transmission line, such as RG-58/U coaxial cable. The A-16 is intended for under-fuselage mounting. It will function satisfactorily under mild icing conditions and at air speeds up to 500 mph, or better. Within the frequency range of 228-258 mc, it has a vswr of less than 2:1.

1-73. LOOP ANTENNAS ARC TYPE L-10 AND L-10A. (See figure 1-4.)

Note

Antenna ARC Type L-10A supersedes the Type L-10. The two components are functionally interchangeable. In the L-10A, the slip-ring arrangement was modified to reduce static during rotation, and the base assembly was revised. The description which follows is applicable to both, though only the L-10A is referenced.

Loop Antenna ARC Type L-10A is a 9-inch diameter rotating antenna designed for top or bottom mounting on aircraft. It provides for aural direction-finding or homing reception. The L-10A is designed for remote control only through the use of Control Unit ARC Type C-18, or a similar component, which may be located as much as 20 feet away and which controls rotation of the L-10A from 0 to 360 degrees. Ease of rotation is effected through the use of ball bearings and a high-ratio worm-gear drive. The L-10A has an inductance of 16 microhenries, a distributed capacity of 69 uuf, and a Q of 46 at 400 kc.

1-74. ANTENNA KIT ARC-12296. (See figure 1-4.) Antenna Kit ARC-12296 includes the necessary parts to install a fixed-wire antenna for use with the R-10A, R-11A, or R-20 receivers, or similar component. The kit includes copper-clad steel antenna wire, lead-in wire, insulators, an antenna-tension spring, and other fittings required for proper installation on aircraft.

1-75. DESCRIPTION OF RELAY UNITS.

1-76. MUTING RELAY ARC TYPE K-11. (See figure 1-5.) Muting Relay ARC Type K-11 consists of a single-pole, double-throw relay and a terminal board, mounted on an aluminum base. The detail parts are enclosed by a snapslide-attached cover. Wiring to the terminal board and relay is brought in through a rubber grommet. Two holes in the base are provided for installation.

1-77. RELAY UNIT ARC TYPE K-12. (See figure 1-5.) Relay Unit ARC Type K-12 is used in conjunction with C-44, C-47, and C-50 control units, or equivalent, for control switching in dual-control installations. The K-12 consists of an aluminum box containing six control relays, three power relays, two keying relays, and two supervisory and switching relays, for switching electrical control of the radio equipment from a control unit in one cockpit to a duplicate control unit in the other cockpit. The K-12 requires the use of Mounting ARC Type M-20 for installation.

1-78. OSCILLATOR-RELAY UNIT ARC TYPE K-13. (See figure 1-5.) Oscillator-Relay Unit ARC Type K-13 is designed for use with any Type 12 control unit that includes a "whistle-through" control. It makes possible the precise tuning of a Type 12 vhf receiver, such as the R-15 or R-19, to a crystal-controlled Type 12 vhf transmitter frequency. The K-13 is operated when the applicable receiver's tuning crank is pushed. The K-13 has the following functions: to connect high voltage to the receiver and transmitter simultaneously; to reduce the receiver sensitivity to a low value; to connect the transmitter output to a 50-ohm dummy load; to switch the microphone out of the circuit; to turn on a neon lamp relaxation-type oscillator, the a-f output of which is injected into the microphone input circuit to provide about 20 percent tone modulation; and to connect the headset (TEL line) to the output of the receiver being tuned, while disconnecting it from all other receivers.

1-79. The K-13 includes a VHF WHISTLE LEVEL adjustment and a UHF WHISTLE LEVEL adjustment. These are preset and locked, and must not be disturbed by the operator. High voltage is obtained from the associated receiver and low voltage from the existing primary power source. The K-13 requires Mounting ARC Type M-24 for installation. All connectors and controls are located on the front of the unit.

1-80. DESCRIPTION OF MOUNTINGS.

1-81. The mountings for the receivers, transmitters, control units, and relay units are either a plate-type or shock-proof vibration-mount type. (See figure 1-6.) In all cases, suitable holes are provided for fastening the mounting to a shelf or bulkhead. The component is mounted and then secured by snapslides engaging the grooved studs on the mounting. The vibration-type mountings have flat, beryllium copper straps on the underside for ground connections. The plate-type mountings have disc-type springs on the top of the plate for mounting tension. Table 1-3 lists the mountings by type number, physical type, and uses.

TABLE 1-3. MOUNTINGS FOR RADIO SET ARC TYPE 12 COMPONENTS

Mounting	Type	Uses
M-11A	Shock-mount	T-11A, T-11B, T-13, T-13A
M-12A	Shock-mount	R-10A, R-11A, R-15, R-19, TV-10
M-13	Plate	C-37, C-38
M-16	Plate	C-47
M-18	Plate	C-16, C-17, C-18, C-54, C-55
M-19	Plate	C-25
M-20	Plate	K-12
M-23	Shock-mount	R-20
M-24	Plate	K-13

1-82. DESCRIPTION OF JUNCTION BOXES.

Note

Junction Boxes ARC Type J-13A and Type J-15A supersede Types J-12, J-13, and J-15. Information concerning the superseded types is included for reference purposes only since they are no longer available.

1-83. GENERAL. Junction boxes are used to facilitate the cabling of multi-unit systems. The junction boxes are potash-dipped, aluminum alloy boxes with snapslide covers permitting easy and convenient access to the interior. Barrier-type terminal boards are used for the wiring terminations, which are secured by nuts to the terminal posts. Each terminal is numbered, except ground terminals which are identified by the letter "G" adjacent to the terminal.

1-84. JUNCTION BOX ARC TYPE J-12. (See figure 1-7.) Junction Box ARC Type J-12 provides 32 terminals plus four ground terminals, a single-pole, double-throw relay, and three 20-ampere fuses for receiver protection. The terminals are arranged in pairs with wire-securing nuts, except for those associated with the relay and fuses, which have one nut and one binding-head screw. The base of the box has five rubber-grommet openings and six collet-type openings, through which the wiring is brought into the box. The J-12 is designed for bulkhead mounting by means of four holes in the base of the box. A hole in each corner of the base permits drainage of accumulated moisture.

1-85. JUNCTION BOXES ARC TYPE J-13 AND J-13A. (See figure 1-7.) Junction Box ARC Type J-13 provides 30 terminals plus four ground terminals, a single-pole, double-throw relay, and three 20-ampere fuses for receiver protection. The J-13A is similar, except that it does not include fuses, so that 33 terminals plus four ground terminals are available. The terminals are arranged in pairs with wire-securing nuts, except for those associated with the relay and fuses, which have one nut and one binding-head screw. Nine rubber-grommet openings are available for wire feed-through. The J-13 and J-13A are mounted by means of four holes in the base of the box. A hole in each corner of the base permits drainage of accumulated moisture.

1-86. JUNCTION BOXES ARC TYPE J-15 AND J-15A. (See figure 1-7.) Junction Boxes ARC Type J-15 and J-15A each provide 56 terminals and seven rubber-grommet openings. The J-15A also includes a relay for primary power application in those Type 12 installations where the total current requirement exceeds 5 amperes. In all other respects, the J-15 is the same as the J-13, and the J-15A is the same as the J-13A. Refer to paragraph 1-85.

1-87. DESCRIPTION OF JACK BOX ARC TYPE J-10.

1-88. Jack Box ARC Type J-10 (see figure 1-7) provides a microphone input jack and a telephone (headset) input jack, and two collet-type openings for wiring connections into and out of the box. The J-10 is mounted by means of two holes in its base.

1-89. ACCESSORIES.

1-90. Accessory items include interconnecting cable parts such as adapters, connectors, bulk cable, cable assemblies, mechanical linkage parts, and mechanical linkage assemblies. Also included are quartz crystals, headset and microphone brackets, a headset, a microphone, telephone plugs, tools, and other miscellaneous parts required to supplement the individual airplane installation. These parts are shown in figures 1-8 and 1-9 and are listed in table 1-1.

SECTION II

OPERATING PROCEDURES

2-1. GENERAL OPERATION INFORMATION.

2-2. INTERCHANGEABILITY OF COMPONENTS. The components of Radio Set ARC Type 12 may be combined in various ways to suit the individual airplane requirements. These may vary from a one-receiver/one-transmitter system to a combined lf-vhf-uhf receiver-transmitter system, either of which may, in addition, be part of a single- or dual-control installation. The flexibility of Radio Set ARC Type 12 is such, that without affecting intercabling, the following components may be interchanged: Radio Receivers ARC Type R-15 and R-19, Radio Receivers R-10A and R-11A, Radio Transmitters T-11A, T-11B, T-13, and T-13A, and Antennas ARC Type A-12 and A-15. Because the frequency coverage of some of these interchangeable components varies, frequency indicating dials and transmitting frequency tabs must be changed, or appropriate control units installed as required.

2-3. SENSITIVITY AND VOLUME CONTROLS. Different methods of controlling headset (or loudspeaker) audio level are used in Type 12 installations. In one method, the receiver's r-f sensitivity is varied. This is accomplished by connecting the associated control unit's audio level control, usually marked SENS, in the cathode circuit of the first r-f stage. This method is used for the R-10A and R-11A receivers. In some installations it is also used for the R-15 and R-19 receivers. Where this method is used for R-15 and R-19 receivers, the associated control unit also has a LO-HI switch. This switch, in the LO position, connects a fixed resistor into the cathode circuit of the final audio-frequency stage, introducing degeneration, and causing an audio level decrease of approximately 10:1. In the HI position, the resistor is not connected. In still another method being used to control the audio level of R-15 and R-19 receivers, the LO-HI switch is omitted, and the associated control unit's audio level control, usually marked VOL, is connected across the secondary of the receiver's output transformer in the final audio-frequency stage. In later models of the R-15 and R-19 receivers, a front-panel-mounted variable resistor (not for operator's use) is connected in the cathode circuit of the noise limiter - first audio amplifier. This resistor is adjusted, and the setting locked, at the time of installation; depending on the setting, background noise is limited to permit high-level settings of the associated VOL (or SENS) control.

2-4. SENSITIVITY SETTING. In order that the incoming signal level may be kept below the range of avc action when operating the R-10A or R-11A receiver in a high-signal-strength area, it is advisable to adjust the r-f sensitivity of the receiver, by means of the associated control unit's SENS control, to a minimum usable setting, to avoid the possibility of course-broadening. Automatic volume control is desirable for ground-to-air reception, but its action is highly undesirable in an application where determination of relative signal strength is a requirement.

2-5. SIMULTANEOUS OPERATION OF RECEIVERS WITH LOOP ANTENNA. The R-10A and R-11A receivers may be operated simultaneously from a common fixed-wire antenna. However, when a common loop antenna is being used, only one receiver should be connected to it at a time for optimum results. To satisfy this requirement, check that the ANT.-LOOP switch, on the control assembly for the receiver being operated with the loop antenna, is set to the LOOP position, while the other receiver's ANT.-LOOP switch is set to ANT.

2-6. DUAL-CONTROL INSTALLATION. In a dual-control installation the mechanical and electrical controls are provided in duplicate so that either operator may take control and operate the system. Control is transferred when the PUSH FOR CONTROL switch on the control unit is depressed. However, the installation is wired so that one operator may take and retain control of the system, regardless of the action of the other operator, by maintaining his PUSH FOR CONTROL switch in a depressed condition.

2-7. TRANSMITTER CRYSTALS. Transmitter crystals are ordinarily installed in ascending order of frequency with the lowest frequency in position 1. Where transmitting frequency tabs are installed around the TRANS selector switch, they should be arranged in a corresponding order in a clockwise direction.

CAUTION

Operating frequencies of the vhf transmitters (T-11A, T-11B, T-13, T-13A) must be kept within a 2-megacycle band of the transmitters' frequency range. Operating frequencies of the uhf transmitter section of the TV-10 must be kept within a single 4-megacycle band, or divided between two 4-megacycle bands with at least a 2-megacycle separation. Operation outside any of these limits will result in a loss of power output at the extremes of the band.

2-8. OPERATING CONTROLS. All operating controls for the components of Radio Set ARC Type 12 are located on the control units. This centralizes the point of operation and facilitates the required operating procedures. The purpose and characteristics of the control units are described in paragraphs 1-46 through 1-68.

2-9. PREFLIGHT OPERATING PROCEDURES. Procedures for checking equipment operation prior to flight are described in paragraphs 2-15 through 2-20. Though these procedures are concerned specifically with receiver and transmitter operation, in effect all operating accessory components such as control units, relay units, etc., are checked out at the same time.

2-10. AIRBORNE OPERATING PROCEDURES. Airborne operating procedures are given in paragraphs 2-22 through 2-30.

2-11. SUMMARY OF USES OF EQUIPMENT. The receiver and transmitter components of Radio Set ARC Type 12 will provide the following:

Air-to-ground vhf transmission, on 116-132 mc, using the T-11A or T-11B transmitter, or on 132-148 mc, with a possible shift downward to 125-132 mc by means of a capacity plate (refer to paragraph 1-35), using the T-13A or T-13B transmitter. These frequency bands permit communication between aircraft and CAA towers and communications stations, and all military towers.

Air-to-ground uhf transmission, using a TV-10 transverter, on 228 to 258 mc.

Reception of ground-to-air communication and navigation signals in the frequency range of 190 to 550 kc, using the R-11A receiver. This frequency band includes CAA four-course ranges; Navy ranges; Marine beacons; CAA, Air Force, and Navy low-frequency tower communications; and the 500-kc distress frequency.

Reception of ground-to-air signals in the frequency range of 520 to 1500 kc, using the R-10A receiver. This frequency band includes commercial broadcast stations.

Manual direction-finding facilities, using a loop antenna and either the 190-550 kc (R-10A) or 520-1500 kc (R-11A) facilities described previously.

Reception of ground-to-air vhf communications on any channel in the frequency range of 108-135 mc, using the R-15 receiver, or 118 to 148 mc, using the R-19 receiver. These frequencies include all CAA and Air Force towers; CAA and Air Force communications stations; CAA, Air Force, and Navy GCA; and the universal emergency frequencies.

Reception of ground-to-air uhf signals in the frequency range of 228-258 mc, using a TV-10 transverter in conjunction with an R-19 receiver.

Visual and aural reception of 75-mc marker-beacon signals, using the R-20 receiver.

2-12. LOCATION AND FUNCTION OF OPERATING CONTROLS.

2-13. Figures 2-1 through 2-20 locate and describe the function of the individual controls of the control units. The illustrations, which follow, are grouped together and arranged in numerical sequence of type number to facilitate their use. Instructions for operating the components follow figures 2-1 through 2-20.

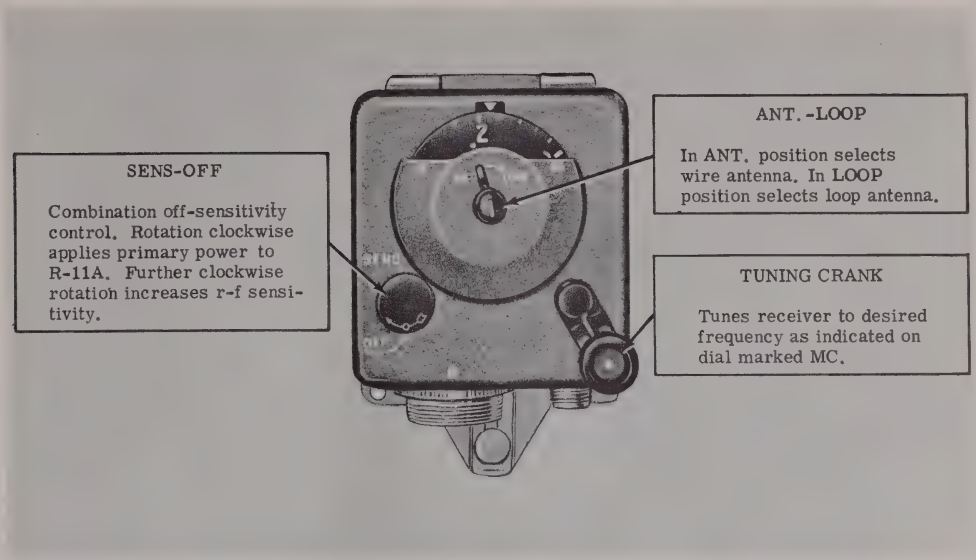


Figure 2-1. Control Unit ARC Type C-16, Location and Function of Operating Controls

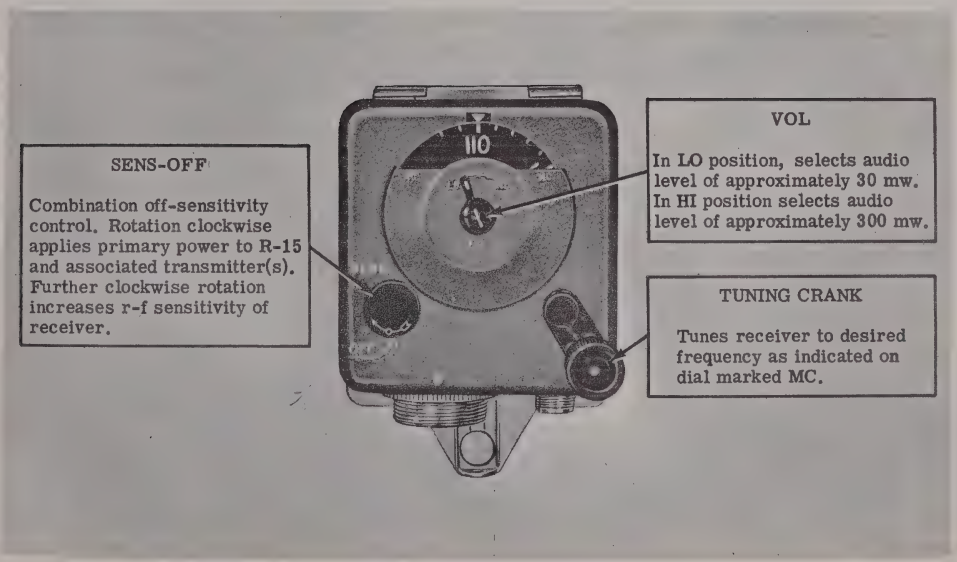


Figure 2-2. Control Unit ARC Type C-17, Location and Function of Operating Controls

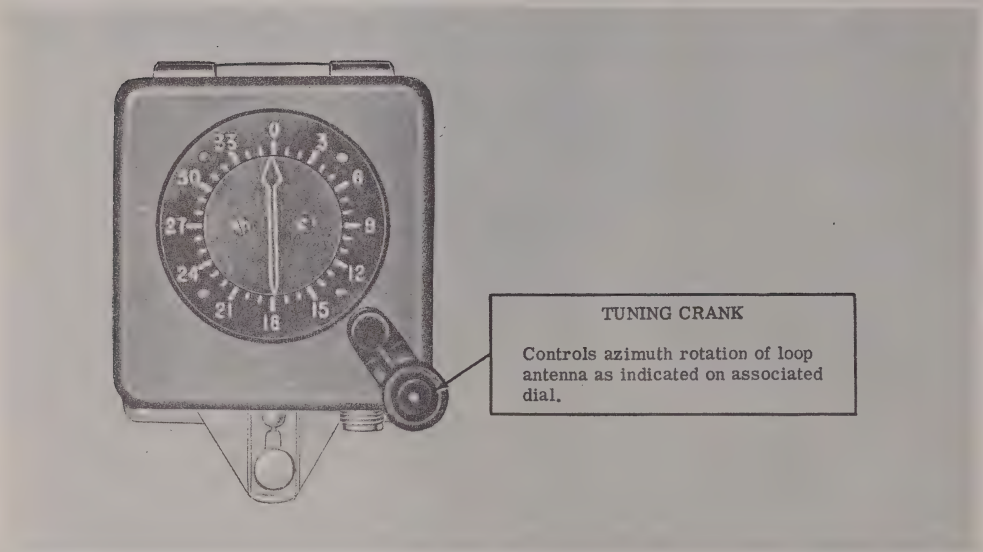


Figure 2-3. Control Unit ARC Type C-18, Location and Function of Operating Control

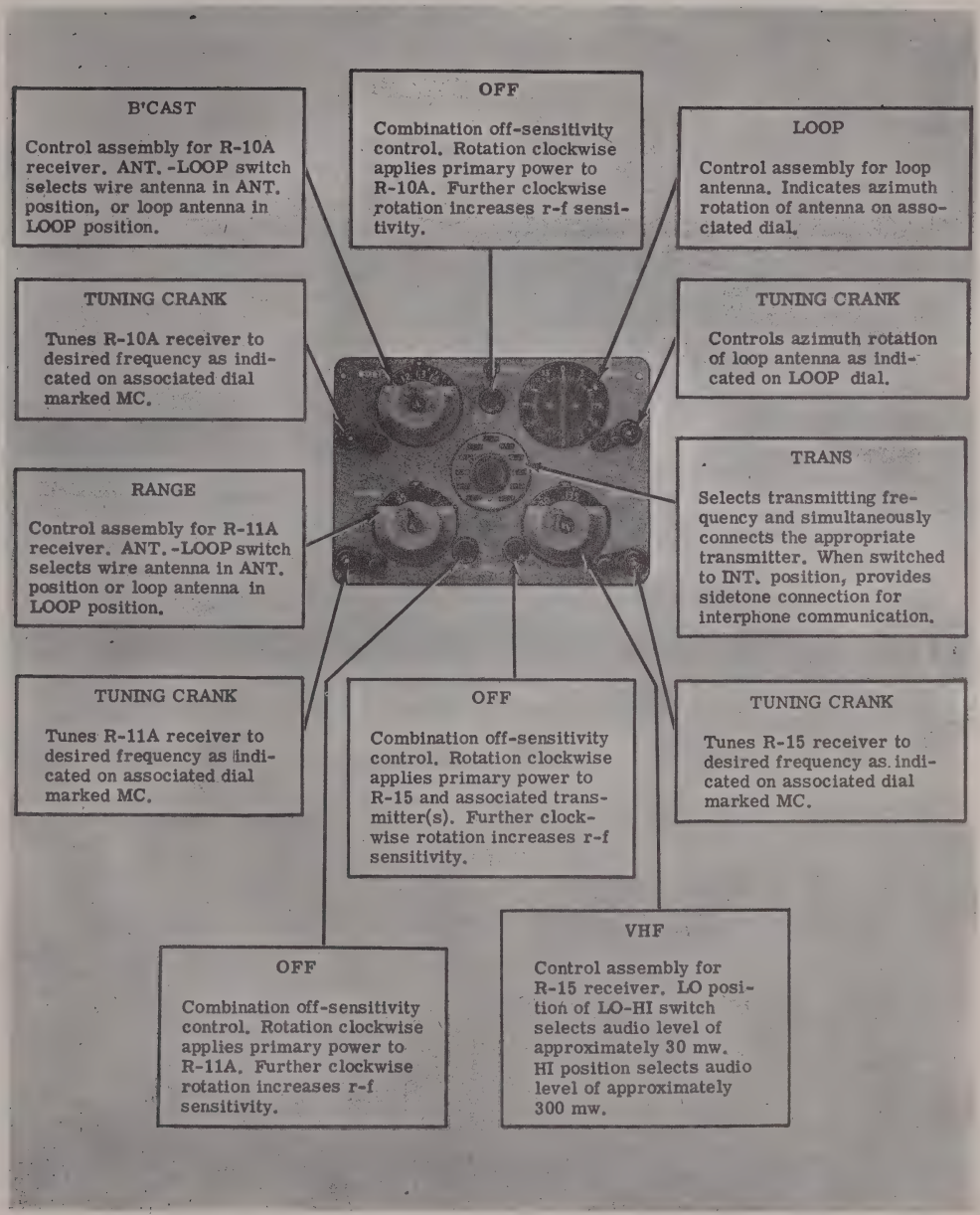


Figure 2-4. Control Unit ARC Type C-24, Location and Function of Operating Controls

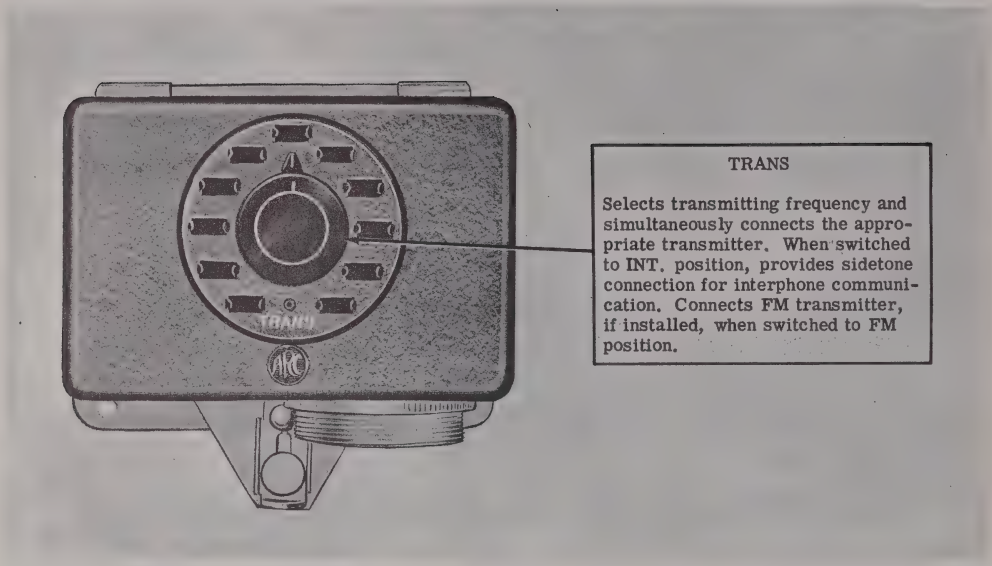


Figure 2-5. Control Unit ARC Type C-25, Location and Function of Operating Controls

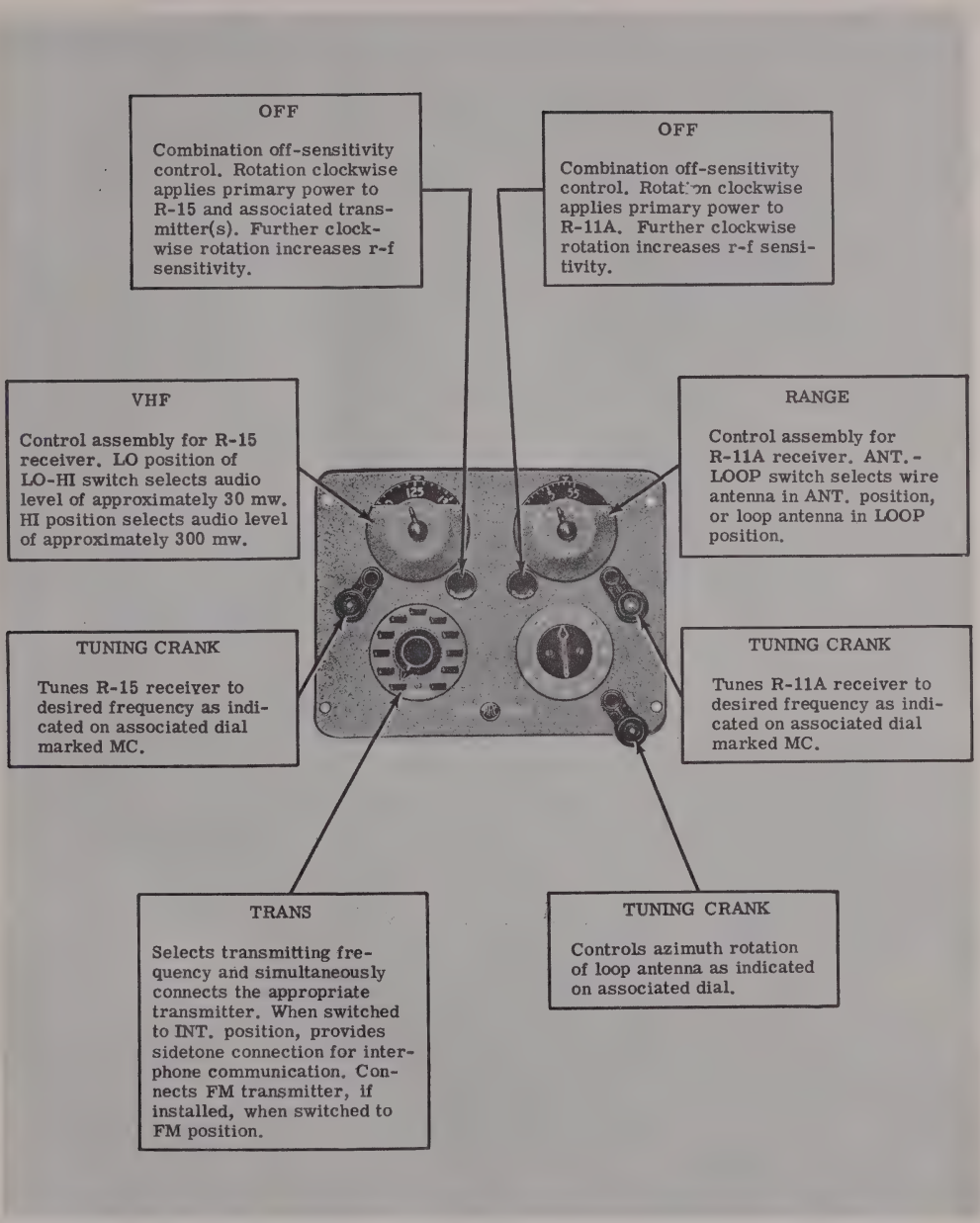


Figure 2-6. Control Unit ARC Type C-36, Location and Function of Operating Controls

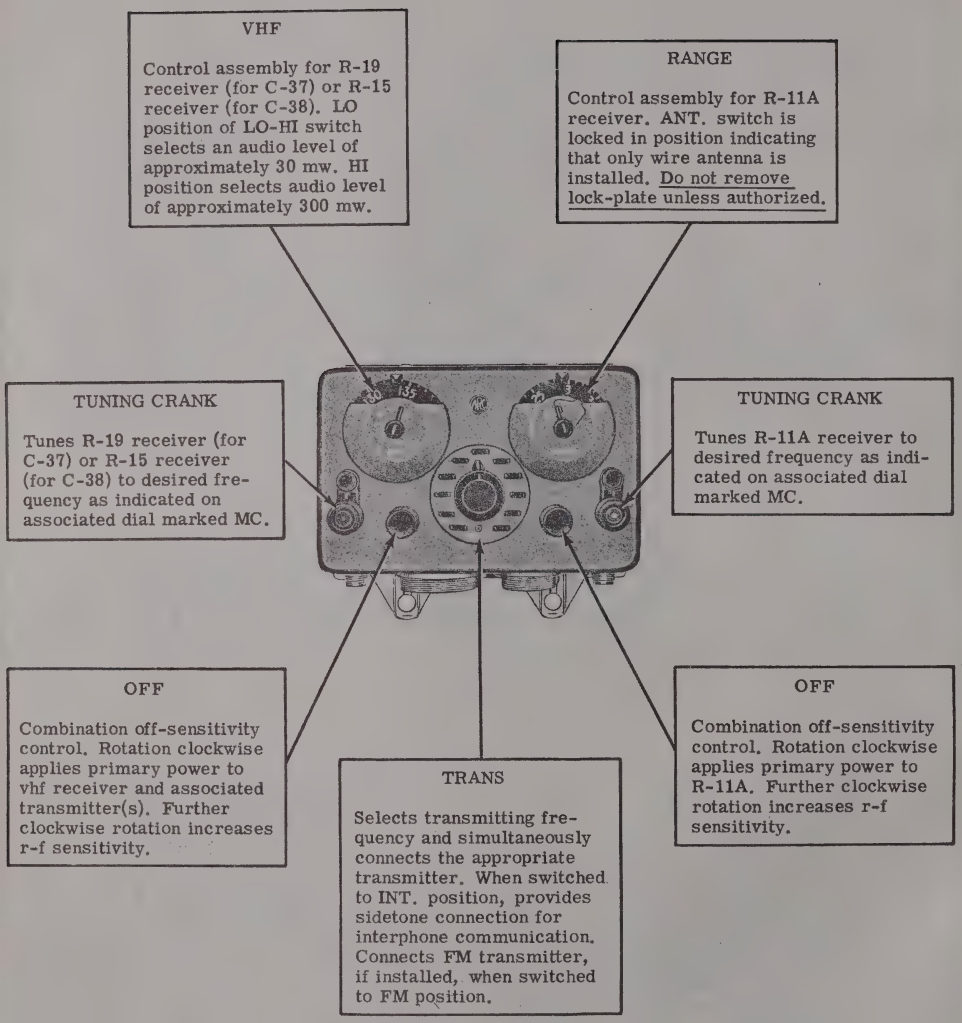


Figure 2-7. Control Units ARC Type C-37 and C-38, Location and Function of Operating Controls

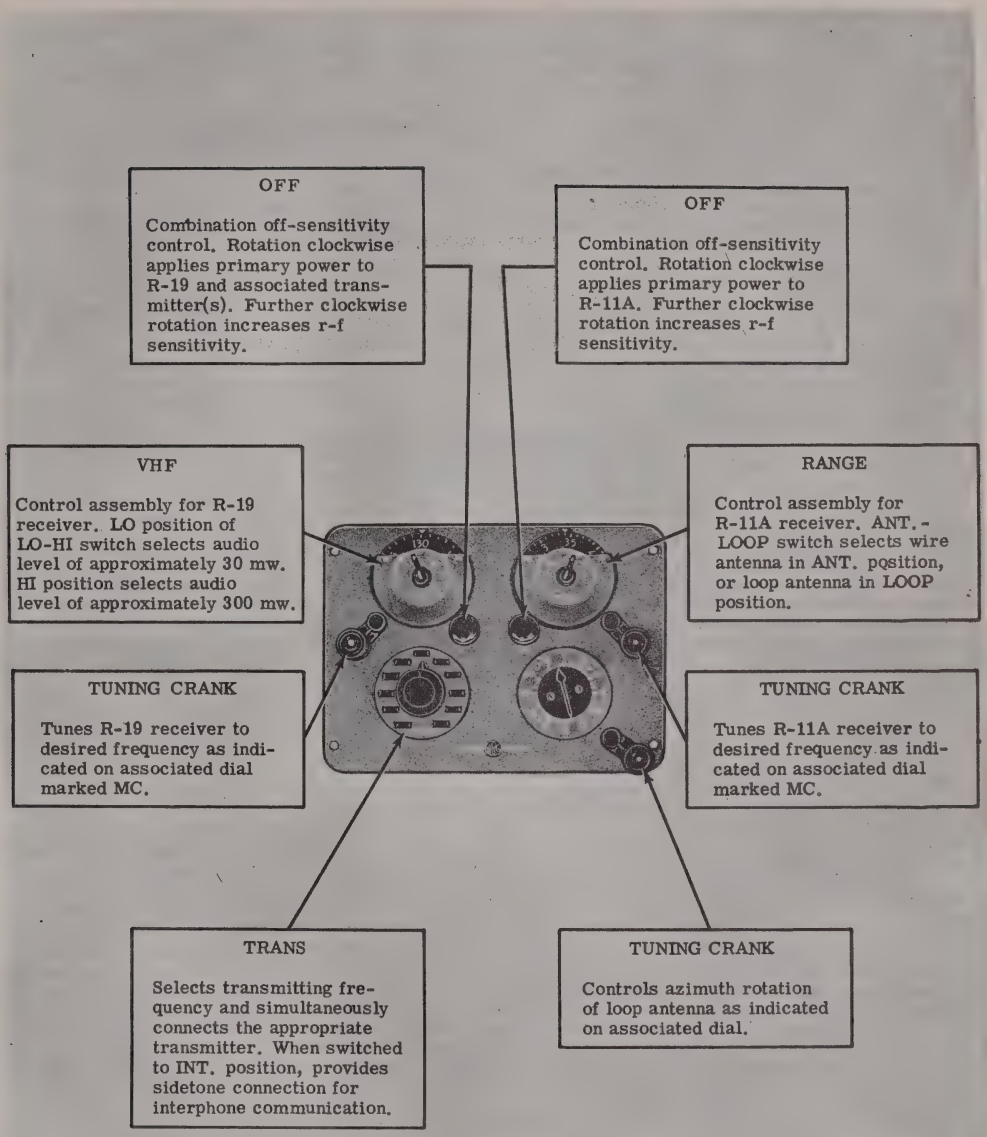
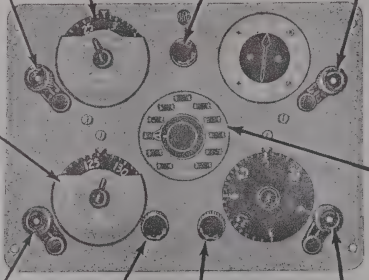


Figure 2-8. Control Unit ARC Type C-39, Location and Function of Operating Controls



RANGE

Control assembly for R-11A receiver. ANT.-LOOP switch selects wire antenna in ANT. position, or loop antenna in LOOP position.

OFF

Combination off-sensitivity control. Rotation clockwise applies primary power to R-11A. Further clockwise rotation increases r-f sensitivity.

TUNING CRANK

Tunes R-11A receiver to desired frequency as indicated on associated dial marked MC.

TUNING CRANK

Controls azimuth rotatio of loop antenna as indica on associated dial.

VHF

Control assembly for R-19 receiver. LO position of LO-HI switch selects audio level of approximately 30 mw. HI position selects audio level of approximately 300 mw.

TRANS

Selects transmitting fre- quency and simultaneous connects the appropriate transmitter. When switc to INT. position, provid sidetone connection for interphone communicatio Connects FM transmitte if installed, when switch to FM position.

TUNING CRANK

Tunes R-19 receiver to desired frequency as indicated on associated dial marked MC.

OFF

Combination off-sensitivity control. Rotation clockwise applies primary power to R-19 and associated transmitter(s). Further clockwise rotation increases r-f sensitivity.

OFF

Combination off-sensitivity control. Rotation clockwise applies primary power to optional tunable component, such as AN/ARC-5 receiver. Further clockwise rotation adjusts r-f sensitivity.

TUNING CRANK

Controls tuning of optiona equipment, such as AN/ARC-5 receiver, whi may be installed in aircr Frequency will be indicat on dial, mounted directly left, which is supplied an installed by using activity

Figure 2-9. Control Unit ARC Type C-40, Location and Function of Operating Controls

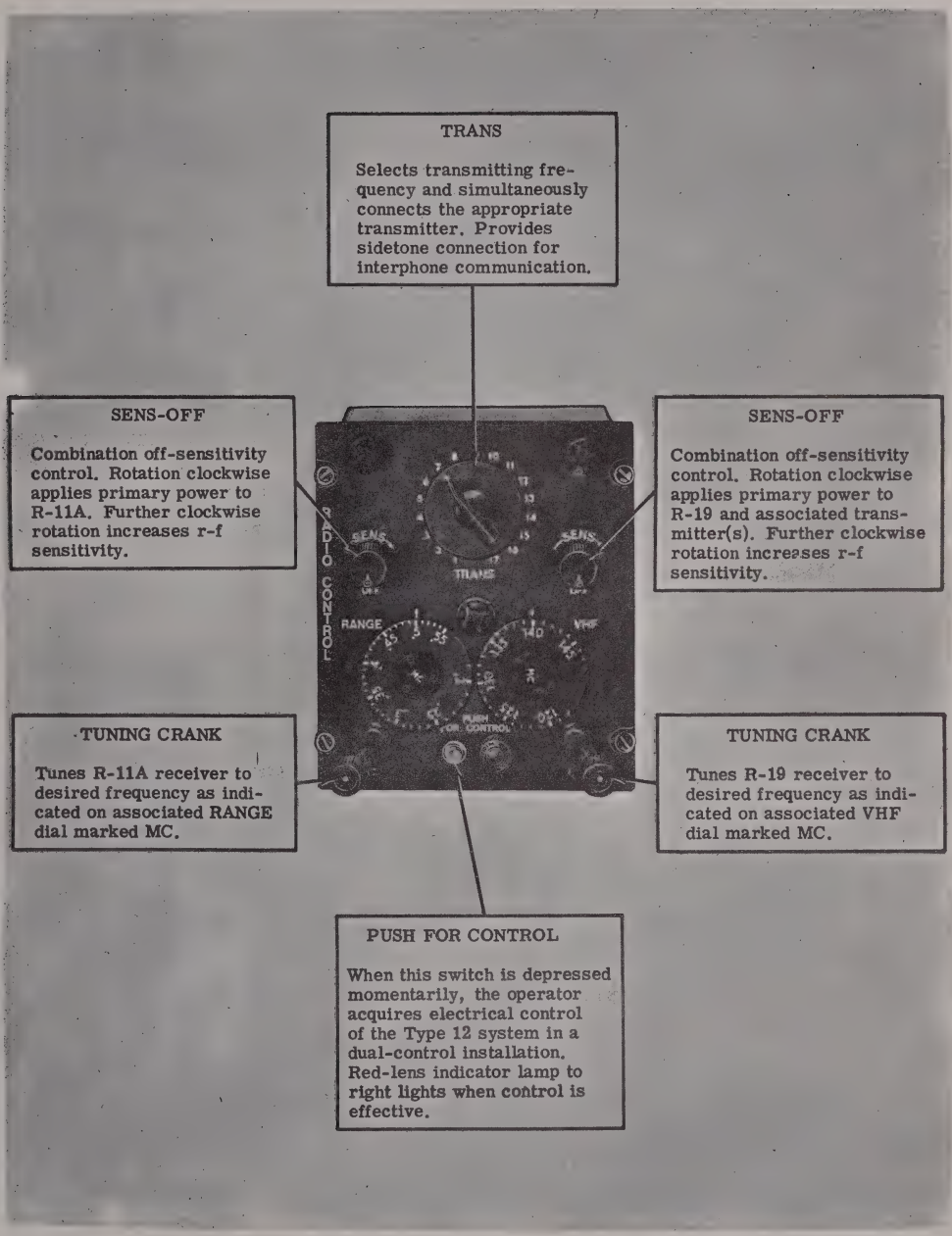


Figure 2-10. Control Unit ARC Type C-44, Location and Function of Operating Controls

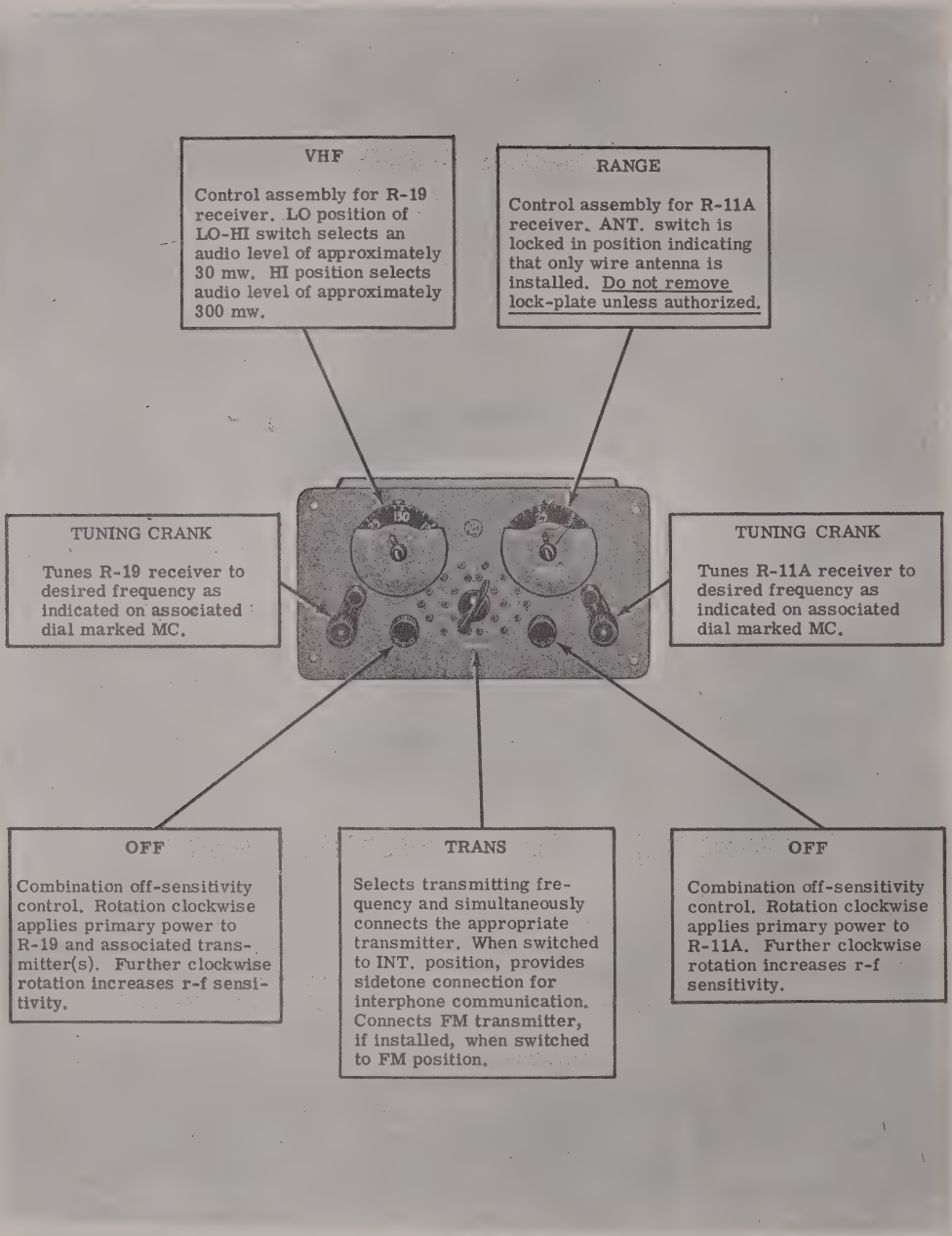


Figure 2-11. Control Unit ARC Type C-46, Location and Function of Operating Controls

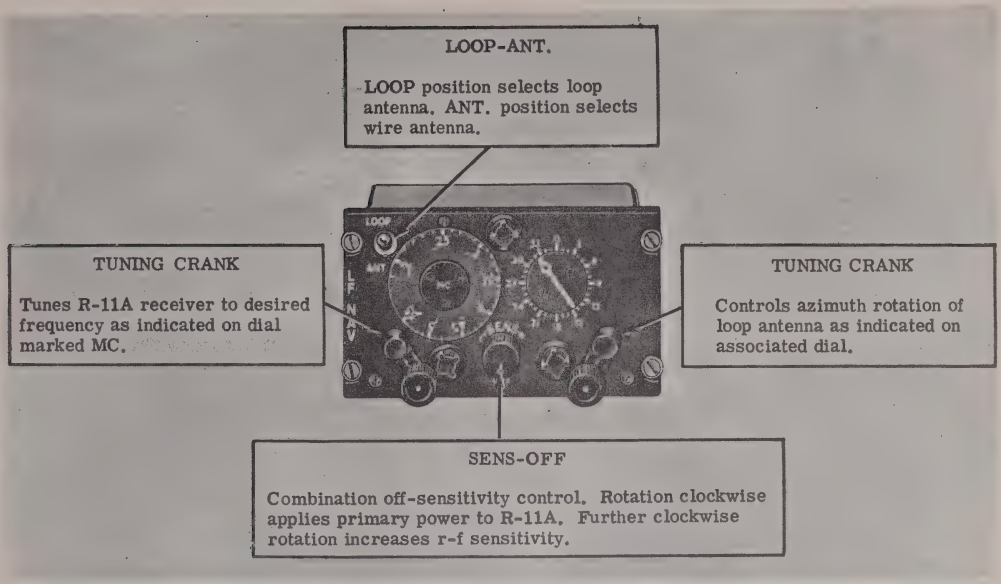


Figure 2-12. Control Unit ARC Type C-47, Location and Function of Operating Controls

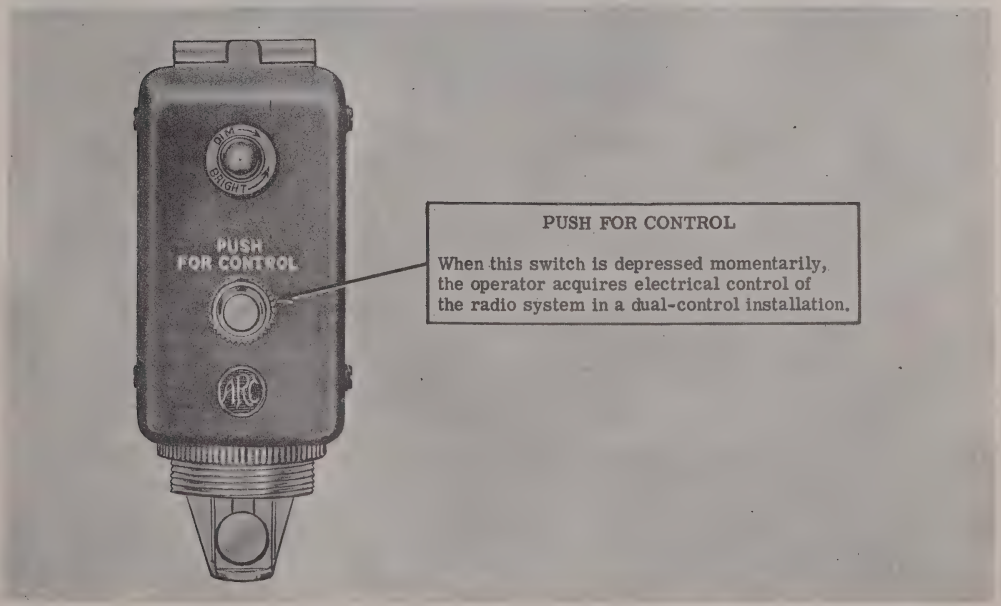


Figure 2-13. Control Unit ARC Type C-48, Location and Function of Operating Controls

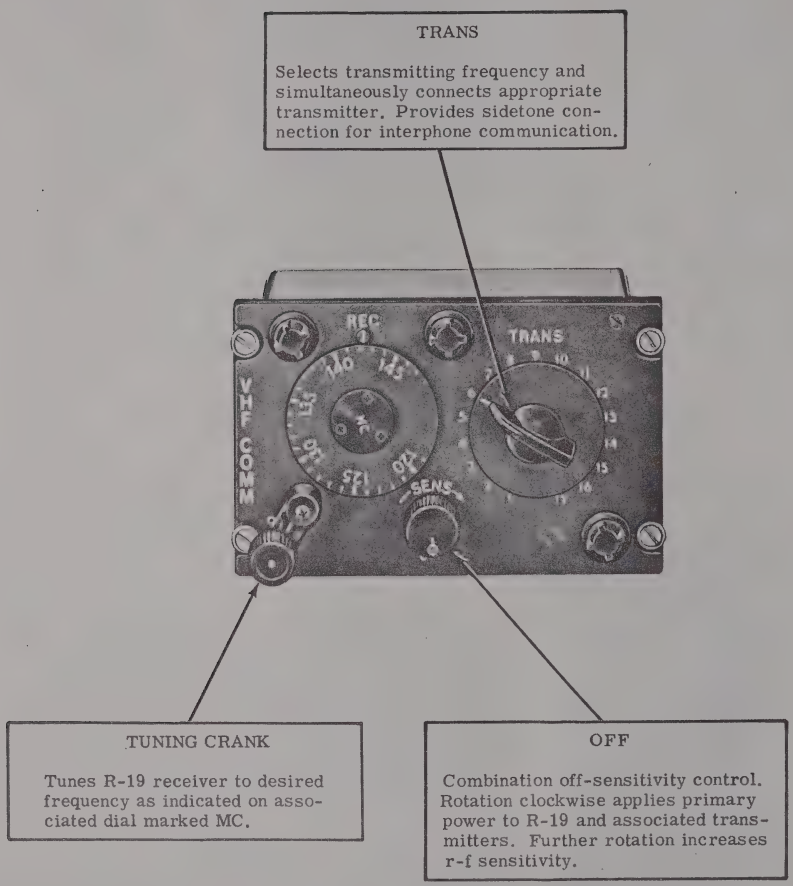
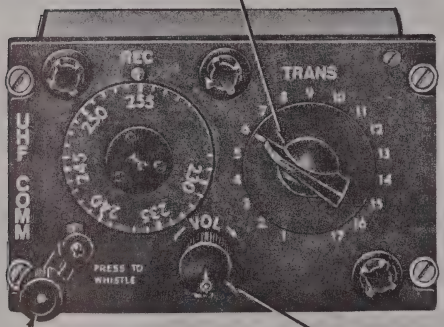


Figure 2-14. Control Unit ARC Type C-49, Location and Function of Operating Controls

Figure 2-15. Control Unit ARC Type C-50, Location and Function of Operating Control



TRANS

Selects uhf transmitting frequency. Provides sidetone connection for interphone communication.

TUNING CRANK

Tuning crank and whistle-through circuit control. Tunes R-19 receiver to desired uhf frequency, in conjunction with TV-10 transverter, as indicated on dial marked MC. When depressed, operates K-13 oscillator-relay unit to permit precise tuning of receiver to select uhf transmitting frequency.

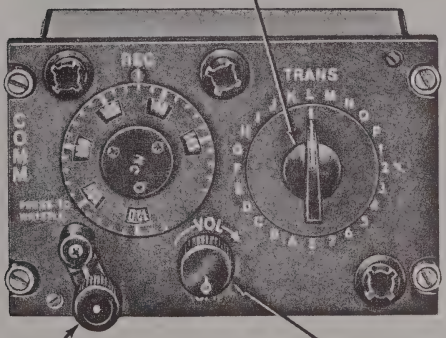
VOL-OFF

Combination off-sensitivity control. Clockwise rotation applies primary power to R-19 and associated transmitter(s). Further clockwise rotation increases level of receiver audio output.

Figure 2-16. Control Unit ARC Type C-52, Location and Function of Operating Controls

TRANS

Selects transmitting frequency and simultaneously connects appropriate transmitter for operation on any of 15 vhf channels and 8 uhf channels. Provides sidetone connection for interphone communication.



TUNING CRANK

Tuning crank and whistle-through circuit control. Tunes R-19 receiver to desired vhf or uhf frequency in conjunction with TV-10 transverter, as indicated on dial marked MC. When depressed operates K-13 oscillator-relay unit to permit precise tuning of receiver to selected vhf or uhf transmitting frequency.

VOL-OFF

Combination off-volume control. Clockwise rotation applies primary power to R-19 and associated transmitter(s). Further clockwise rotation increases level of receiver audio output.

Figure 2-17. Control Unit ARC Type C-53, Location and Function of Operating Controls

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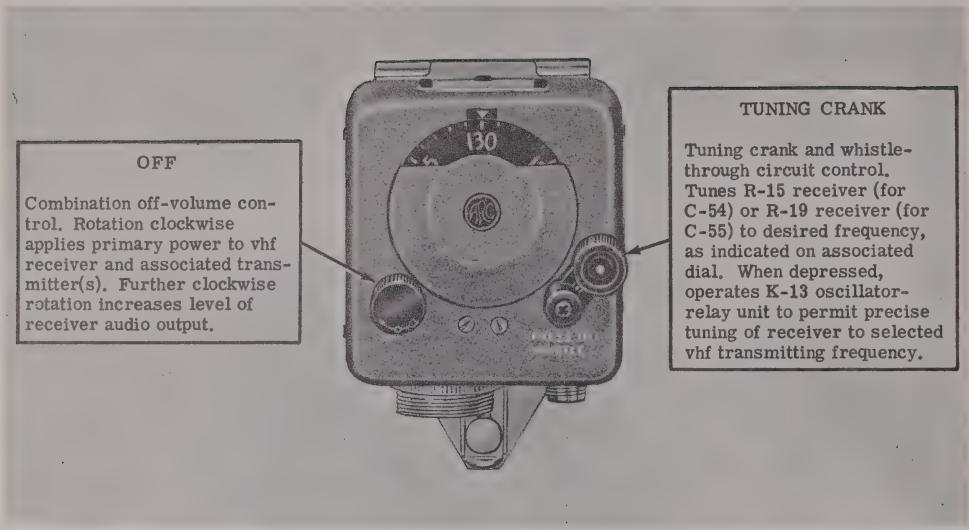
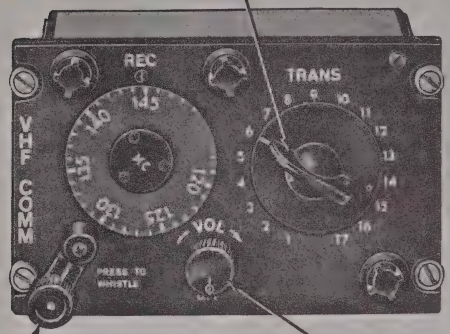


Figure 2-18. Control Units ARC Type C-54 and C-55, Location and Function of Operating Controls



TRANS

Selects transmitting frequency and simultaneously connects appropriate transmitter. Provides sidetone connection for interphone communication.

TUNING CRANK

Tuning crank and whistle-through circuit control. Tunes R-19 receiver to desired frequency as indicated on associated dial marked MC. When depressed operates K-13 oscillator-relay unit to permit precise tuning of receiver to selected vhf transmitting frequency.

VOL-OFF

Combination off-volume control. Rotation clockwise applies primary power to R-19 and associated transmitter(s). Further clockwise rotation increases level of receiver audio output.

Figure 2-19. Control Unit ARC Type C-56, Location and Function of Operating Controls

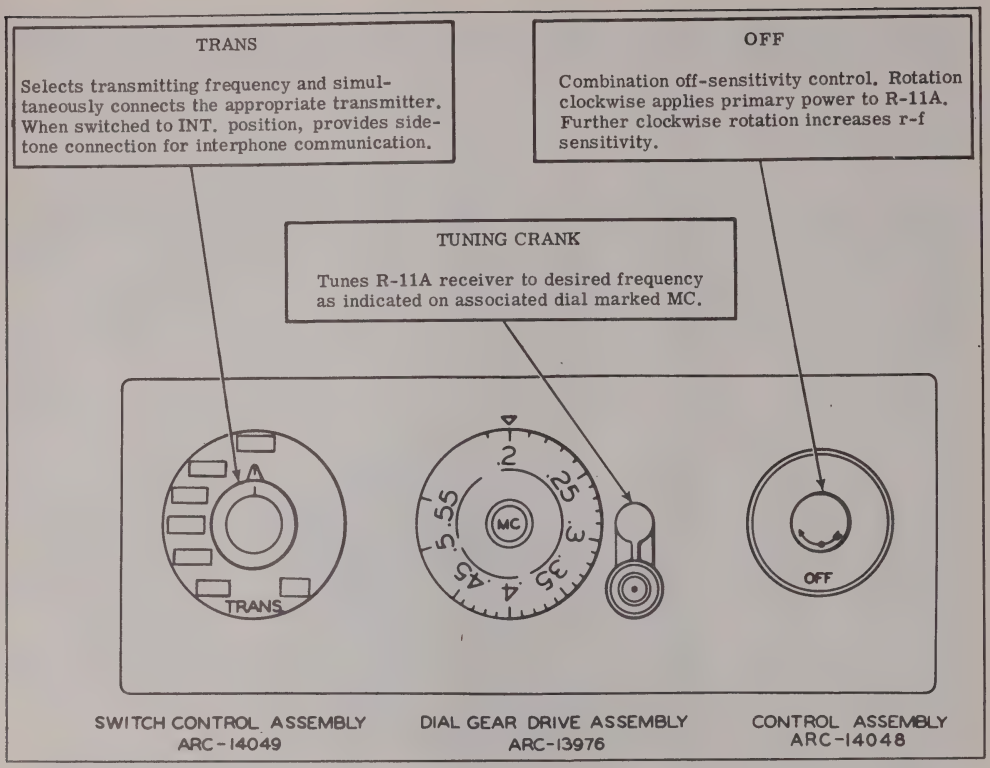


Figure 2-20. Radio Set ARC Type 12, Model H-13B Helicopter Installation, Location and Function of Operating Controls

2-14. OPERATION, PREFLIGHT.

2-15. R-10A OR R-11A RECEIVER. For a preflight operational check of either the R-10A or R-11A, proceed as follows:

a. Switch on airplane's electrical system.

b. Apply power to receiver by turning applicable SENS-OFF control fully clockwise. Allow equipment to warm up for two to three minutes.

c. Set ANT.-LOOP switch of receiver's control assembly to ANT.

d. Rotate appropriate tuning crank and check operation of receiver over the entire frequency range. Adjust the sensitivity, as required, with the SENS-OFF control.

e. Tune the receiver to a selected station. Set the ANT.-LOOP switch to LOOP. Check that any other ANT.-LOOP switch present is set to the ANT. position, since optimum results are achieved when only one receiver at a time is operated on LOOP.

f. Alternately rotate the loop antenna by means of the LOOP tuning crank, and adjust the sensitivity by means of the SENS-OFF control for the sharpest minimum signal. Note the LOOP dial reading. Rotate the loop antenna 180 degrees, and check that the same relative value of signal is received at that point.

g. Turn SENS-OFF control fully counterclockwise (power off).

h. Switch off airplane's electrical system unless required for other purposes.

2-16. R-15 OR R-19 RECEIVER. For a preflight operational check of either the R-15 or R-19, proceed as follows:

a. Switch on airplane's electrical system.

b. Apply power to the receiver by turning the applicable SENS-OFF (or VOL-OFF) control fully clockwise. Allow the equipment to warm up for two to three minutes.

c. Set the LO-HI switch (if provided) of the receiver's control assembly to LO.

d. Rotate the appropriate tuning crank and check operation of receiver over the entire frequency range. Adjust the audio level as required, with either the SENS-OFF control or the VOL-OFF control, whichever is installed.

e. If "whistle-through" tuning is provided, push in tuning crank, and tune receiver to any transmitting frequency, until maximum whistle is heard. Compare receiver frequency dial reading to transmitting frequency. (Any one of the transmitting frequencies may be used to check "whistle-through" tuning.)

f. Switch the LO-HI switch (if provided) to HI and check the operation of the receiver on a relatively weak signal. Adjust the audio level as required.

g. Switch off airplane's electrical system, unless required for other purposes.

2-17. R-20 RECEIVER. No practical preflight operational check of the R-20 can be made, but the signal lamp should be checked for operation by pushing the test switch, which is part of the lamp socket. If the lamp lights, it may be assumed that low voltage is present and, if the Type 12 receiver from which high voltage is obtained has been checked out, it may be assumed that high voltage is also being supplied to the R-20.

2-18. T-11A, T-11B, T-13 OR T-13A TRANSMITTER. For a preflight operational check of the T-11A, T-11B, T-13, or T-13A transmitter, proceed as follows:

a. Switch on airplane's electrical system.

b. Apply power to the transmitter by switching on the SENS-OFF (or VOL-OFF) control of the receiver (usually the vhf receiver), which is interconnected to the transmitter.

c. Apply power to the receiver whose range includes the frequency upon which a reply will be requested. (Disregard this step if the receiver involved is the same as that of step b., since power is already applied.)

d. Allow all equipment to warm up for two to three minutes.

e. Tune the selected receiver to the frequency on which a reply is expected.

f. Set the control unit's TRANS switch to desired transmitting frequency.

g. To check transmitter operation, close microphone switch and call selected station; speak directly into microphone and state frequency upon which reply is awaited. To receive, release microphone switch as soon as transmission is completed.

h. If interphone circuit is included, set TRANS switch to interphone position, close microphone switch, speak into microphone, and check interphone transmission and headset (or loudspeaker) reception.

i. If an FM transmitter, such as Type SCR-619 (not part of Type 12) is installed, set the TRANS switch to FM position. Check out the FM transmitter by operating it as outlined in the applicable handbook.

j. Turn receivers' SENS-OFF (or VOL-OFF) controls fully counterclockwise (power off).

k. Switch off airplane's electrical system, unless required for other purposes.

2-19. TV-10 TRANSVERTER. For a preflight operational check of the TV-10, switch the control unit's TRANS switch to a uhf position, and check the transmission and reception on a uhf frequency in the same manner described for vhf operation in paragraphs 2-16 and 2-18.

2-20. DUAL-CONTROL INSTALLATION. Preflight operation of a dual-control installation is the same as for a single-control installation. Since all mechanical and electrical controls are provided in duplicate, each operator should check his system individually. In addition, each operator should check for proper transfer of control when the respective PUSH FOR CONTROL switch is operated, and the master station should check for override control.

2-21. OPERATION, AIRBORNE.

Note

It is assumed in the airborne operating procedures which follow that all necessary electrical controls which are not part of the Type 12 are in their proper position for the furnishing of primary power.

2-22. R-10A OR R-11A RECEIVER OPERATION WITH FIXED-WIRE ANTENNA. Airborne operation of either the R-10A or R-11A using the fixed-wire antenna is the same. If desired, both the R-10A and R-11A may be operated simultaneously with the wire antenna. Proceed as follows:

a. Apply power to receiver by turning applicable SENS-OFF control fully clockwise. Allow equipment to warm up.

b. Set ANT.-LOOP switch of receiver's control assembly to ANT.

c. Rotate appropriate tuning crank to tune receiver to desired station frequency.

d. Reduce sensitivity with SENS-OFF control until the audio output drops sharply and substantially. (Refer to paragraph 2-4.)

e. Check station identification.

2-23. R-10A OR R-11A RECEIVER OPERATION WITH LOOP ANTENNA. Airborne operation of either the R-10A or R-11A using the loop antenna is the same. However, only one receiver should be operated at a time for best loop antenna reception. Proceed as follows:

a. Follow the same procedure, as outlined in paragraph 2-22, for fixed wire reception.

b. Set ANT.-LOOP switch to LOOP position. Check that any other operating receiver's ANT.-LOOP switch is set to ANT.

c. Rotate the loop antenna by means of the LOOP control and adjust the receiver sensitivity for the sharpest minimum signal. Alternately readjust the loop position and sensitivity control until this sharply defined null is obtained.

d. Read the bearing on the LOOP control dial. This is the station bearing from the heading of the airplane.

CAUTION

Two such nulls, 180 degrees apart, will be present. This ambiguity must be resolved by the operator's knowing the general position of the airplane with respect to the station. If unknown, use either Method 1, described in paragraph 2-24, or Method 2, described in paragraph 2-25, to eliminate this ambiguity.

2-24. DETERMINATION OF STATION BEARING, METHOD 1. A simple procedure to determine the position of the airplane with respect to a station, when using a loop antenna (refer to paragraph 2-23), is as follows:

a. Reduce the volume of the received signal to the point where it is just audible.

b. Fly directly toward (or away from) the station.

c. If the signal strength increases, the airplane is headed toward the station. If the signal fades out permanently, the airplane is headed away from the station.

2-25. DETERMINATION OF STATION BEARING, METHOD 2. An alternative method to that described in paragraph 2-24 for determining a station bearing requires an accurate determination of the null, and a simultaneous reading of the airplane's gyro compass. Proceed as follows:

a. Set the LOOP control to 0 degree.

b. Head the airplane into a null signal and note the gyro compass reading G_1.

c. Fly for approximately five minutes at the G_1 reading plus 90 degrees.

d. Head the airplane into the null signal, turning back toward the G_1 heading, and note the gyro compass reading G_2.

e. If G_2 is less than G_1, the heading G_1 is toward the station. If G_2 is greater than G_1, the heading G_1 is away from the station.

2-26. R-15 OR R-19 OPERATION. Airborne operation of the R-15 or R-19 receiver is the same. If the installation includes a K-13 oscillator-relay unit for "whistle-through" tuning, precise tuning of the receiver to a transmitting frequency is possible. Proceed as follows:

a. Apply power to the receiver by turning the applicable SENS-OFF (or VOL-OFF) control fully clockwise. Allow the equipment to warm up.

b. Set the LO-HI switch (if provided) of the receiver's control assembly to LO.

Note

Ordinarily the LO position will provide a strong enough signal. If the signal cannot be increased to the desired level, using the sensitivity control, use the HI position.

c. Rotate the appropriate tuning crank and tune in the desired station; reduce the volume by means of the SENS-OFF (or VOL-OFF) control so that the signal strength decreases as the station is tuned in.

d. If "whistle-through" tuning is available, the receiver may be tuned precisely to a transmitting frequency by setting the TRANS switch to the frequency desired and then pressing the receiver tuning crank while tuning for maximum whistle.

e. When the station is tuned in accurately, adjust the audio level by means of the SENS-OFF (or VOL-OFF) control.

2-27. R-20 OPERATION. The R-20 is prepared for operation when the receiver to which it is connected for primary and high voltage is switched on.

2-28. T-11A, T-11B, T-13, OR T-13A OPERATION. To operate any of the vhf transmitters proceed as follows:

a. Apply power to the transmitter by rotating the SENS-OFF (or VOL-OFF) control of the receiver (usually the vhf receiver) connected to the transmitter being operated.

b. If a reply is expected on another receiver's frequency, apply power to that receiver, and tune the receiver to the reply frequency.

c. Allow equipment to warm up.

d. Set control unit's TRANS switch to desired transmitting crystal frequency or, if interphone is desired, to interphone position. If operation of FM equipment (if installed) is desired, set the TRANS switch to FM.

e. Close microphone switch and speak directly into microphone.

f. To receive, release microphone switch as soon as transmission is completed.

2-29. TV-10 OPERATION. The TV-10 is used for the reception and transmission of uhf signals. (Refer to paragraphs 1-38 through 1-41.) To receive or transmit, proceed as follows:

a. Apply power by rotating the associated receiver's VOL–OFF control. Allow equipment to warm up.

b. Set the control unit's TRANS switch to the desired uhf transmitting frequency.

c. To transmit, close the microphone switch and speak directly into the microphone.

d. To receive, release microphone switch as soon as transmission is completed.

e. To receive, tune the associated receiver to the desired receiving frequency. If the frequency is the same as one of the transmitting frequencies, use the "whistle-through" facility for precise tuning.

2-30. OPERATION OF DUAL-CONTROL SYSTEM. For airborne operation of a dual-control installation, once the PUSH FOR CONTROL switch is pushed to transfer control, follow the applicable procedure for receiving or transmitting, described in paragraphs 2-22 through 2-29. (Refer to paragraph 2-6.)

2-31. OPERATION, SECURE.

2-32. To secure any one of the receivers or transmitters, turn the appropriate SENS-OFF (or VOL-OFF) control fully counterclockwise until the on-off switch is operated. To secure the complete Type 12 system, either turn all SENS-OFF (or VOL-OFF) switches to their OFF positions, or if a master radio switch is installed, switch it off.

2-33. EMERGENCY TURN-OFF PROCEDURE.

2-34. If a separate master radio control switch, or equivalent, is installed, set this switch in its off position if an emergency shut-down is required.

SECTION III

OPERATING CHECKS AND ADJUSTMENTS

CAUTION

No transmissions will be made on emergency (distress) VHF or UHF Channels except for emergency purposes. For testing, demonstration or drill purposes, radio equipment will be operated into a nonradiating dummy load instead of an Antenna to prevent transmission of false distress signals.

3-1. PREFLIGHT OPERATING CHECKS AND ADJUSTMENTS.

3-2. Table 3-1 outlines the operating checks and adjustments to be made, as applicable, prior to flight.

TABLE 3-1. PREFLIGHT OPERATING CHECKS AND ADJUSTMENTS

What To Check	How To Check or Adjust
Interconnecting cables and mechanical linkage	Visually and manually check that all interconnecting cables and mechanical linkage are securely and properly connected. Connector rings should be hand-tight.
Dynamotors	With airplane's electrical system and control unit's SENS-OFF (or VOL-OFF) controls switched on, feel dynamotors to check that they are operating, that no excessive vibration exists, and that operation is smooth as evidenced by an even hum. Normal operation of receiver is indicative of proper high-voltage output from dynamotor.
Tuning cranks and selector switch	Rotate tuning cranks and selector switch, and check that operation is smooth without binding or slipping at any point.
Loop antenna operation	Rotate LOOP tuning crank and check that loop antenna rotates without binding or slipping. Compare the azimuth position of the loop antenna with the LOOP indicator dial bearing. At a 90-degree indication, the plane of the loop should be exactly fore and aft.
Microphone and headset	Visually check that microphone and headset are available and are connected properly to J-10 jack boxes.
T-13 or T-13A transmitter frequency-extending capacity plate	If the T-13 or T-13A transmitter is to be operated below the normal low end of the frequency range, remove the top snapslide cover and check that capacity plate ARC-15392, for the T-13, or ARC-15900, for the T-13A, is installed and secured properly. (Refer to paragraph 1-35.) Replace cover.

TABLE 3-1. PREFLIGHT OPERATING CHECKS AND ADJUSTMENTS (Cont)

What To Check	How To Check or Adjust
Transmitter crystals	Remove the top snapslide cover of the vhf transmitters, or the dust cover of the TV-10. Compare the output frequency of each crystal, marked on top of the crystal holder, and its socket position, with the corresponding frequency tabs or frequency chart and the TRANS selector switch positions. Replace cover. Note Except for crystals ARC-17142, crystals which are housed in holders not stamped HERMETIC or OK on the two opposite sides of the holder should be tested for frequency accuracy under actual transmitting conditions, or equivalent. If a tolerance of ±0.02 percent for ARC-10714 crystal units, or ±0.01 percent for ARC-14958 crystal units, of the nominal frequency stamped on the side of the holder is not realized, replace the crystal. Mark accordingly all crystals which are not faulty and reinstall.
Combined vhf-uhf frequency dial	Where a combined vhf-uhf frequency dial, such as in the C-53 control unit, is installed, check, as the channel selector switch is changed from vhf to uhf or vice versa, that the proper frequency range indications become fully visible.
"Whistle-through" tone	If "whistle-through" tuning is available, push the tuning crank and check that a sufficient whistle level is present. In a combined vhf-uhf installation, check whistle level for both vhf and uhf. If the whistle level requires adjustment, notify cognizant maintenance personnel.

3-3. AIRBORNE OPERATING CHECKS AND ADJUSTMENTS.

3-4. Table 3-2 outlines the checks and adjustments to be made, as applicable, during airborne operation.

TABLE 3-2. AIRBORNE OPERATING CHECKS AND ADJUSTMENTS

What To Check	How To Check or Adjust
Sensitivity setting for R-10A or R-11A receiver	When operating the R-10A or R-11A receiver in a high-signal-strength area, adjust the applicable sensitivity control to a minimum usable setting to avoid course broadening. (Refer to paragraph 2-4.) When the loop antenna is being used for reception by the R-10A or R-11A, set the applicable SENS-OFF control to the minimum usable setting to prevent avc interaction. (Refer to paragraph 2-4.)

TABLE 3-2. AIRBORNE OPERATING CHECKS AND ADJUSTMENTS (Cont)

What To Check	How To Check or Adjust
Sensitivity setting for R-15 or R-19 receiver	When tuning the R-15 or R-19 receiver, set the applicable LO-HI switch (if provided) to LO, and adjust the corresponding SENS-OFF control for maximum tolerable noise before tuning to the desired station. Final tuning should be done with this control backed off so that the signal is weak. As a final adjustment, increase this setting to the desired maximum point. If several headsets are used simultaneously, set the LO-HI switch to HI. If sufficient volume cannot be obtained with the sensitivity control, set the LO-HI switch to HI.
ANT.-LOOP switch	When the loop antenna is in use with either the R-10A or R-11A receiver, check that the corresponding ANT.-LOOP switch of the receiver not being used with the loop antenna is set to ANT.
TRANS switch	Before transmitting, check that the TRANS switch is set to the desired frequency channel position.
Microphone switch	Release microphone switch, as soon as transmission is completed, to receive.
Station calling	Do not call a station until certain that it is not communicating with another station.

SECTION IV

EMERGENCY OPERATION AND REPAIR

4-1. EMERGENCY OPERATION.

4-2. Table 4-1 is a suggested list of procedures to be used for emergency operation of the equipment. It is assumed that the referenced parts or components are defective and that no replacements are available. Since some of the procedures require access to the interiors of the components, they are not always practicable during flight. For possible interchangeability of components, refer to paragraph 2-2.

TABLE 4-1. EMERGENCY OPERATION PROCEDURES

Trouble	Remedy
DYNAMOTOR FAILURE	Replace with dynamotor from unused or least necessary receiver.
R-11A RECEIVER INOPERATIVE	If R-11A is not operating properly, and the R-10A is available, it is possible to utilize commercial broadcast signals in the vicinity of the destination for navigation information by using the R-10A and the loop antenna.
ELECTRON TUBE FAILURE	Replace with corresponding type from component not in use, or least required.
FUSE FAILURE	If receiver fuse has failed and other receivers installed contain fuses, replace with fuse from receiver not in use or from one not required to complete mission. Active fuses for installations including a J-12 or J-13 junction box are contained therein. If fuses are installed on front panels of receivers of such installations, they are inactive and therefore may be used to replace a defective fuse in the junction box. If no fuses are available, and component use is imperative, short fuseholder out of circuit.
CONTROL UNIT FAILURE	Since no facilities for local operation are available, disconnect the nondefective control unit from the receiver not in use, or least required, and substitute for defective component; disregard substitute control unit dial indications. If a C-16 is substituted for a C-17 (or correspondingly a B'CAST control assembly for a RANGE control assembly), set the ANT.-LOOP switch in LOOP position for emergency operation, since the ANT. position will result in no audio output.
FAILURE OF RECEIVER POWERING TRANSMITTER	Disconnect transmitter from defective receiver and connect to nondefective receiver to restore transmission.
LOOP ANTENNA CONTROL UNIT FAILURE	Use fixed-wire antenna for reception.
BATTERY NOT RECHARGING	To conserve battery, turn off all components except one actually in use.
SEVERE OUTSIDE INTERFERENCE	Use vhf or uhf components: R-15, R-19, TV-10, T-11A, T-11B, T-13, T-13A; or use loop antenna, if available, with R-10A or R-11A. Turn all others off.

TABLE 4-1. EMERGENCY OPERATION PROCEDURES (Cont)

Trouble	Remedy
POOR RECEPTION WITH FIXED-WIRE ANTENNA	Use loop antenna.
TRANSMITTER FAILURE	Use other vhf transmitter, if installed. If due to "power supply" receiver failure, reconnect transmitter to operating receiver. If uhf facilities are available, transmit on uhf frequency.

4-3. EMERGENCY REPAIR.

4-4. GENERAL. Improper functioning of components or circuit failure may be due to minor faults which may be repaired by the operator. These may include loose cable connections between units or to the primary power source, electron tube failure, blown fuses, or burned-out lamps. Replacement procedures for such items are described in the following paragraphs. Figures 4-1 through 4-10 show the location and type of electron tubes and crystal units. Electrical schematic diagrams of the components (figures 4-11 through 4-47) are included for reference.

4-5. REPLACEMENT OF CRYSTALS. The T-11A, T-11B, T-13, and T-13A transmitters may each contain from one to five crystals. The TV-10 transverter may contain up to eight crystals. Figures 4-6 through 4-10 show the location of these parts. To replace a crystal, proceed as follows:

a. Shut down all power to transmitter.

b. Slide back the snapslide fasteners which secure the top cover of the vhf transmitter, and remove the cover. For the TV-10, remove the dust cover.

c. Remove the defective crystal from its socket and insert the new crystal.

d. Replace cover and secure.

4-6. REPLACEMENT OF ELECTRON TUBES. All electron tubes are easily accessible from the top of the component. Figures 4-1 through 4-10 are electron tube location diagrams. To replace an electron tube, proceed as follows:

a. Shut down all power to component.

b. Slide back the snapslides which secure the component's top cover and remove the cover.

c. Pull out the defective tube and insert the new tube.

d. Replace cover and secure.

4-7. REPLACEMENT OF LAMPS. All edge-lighted plastic panel AN. console control units, and those control units used for dual-control installations, contain panel lamps. For 28-volt operation, the edge-lighted control units use midget flange-base AN3140-327 lamps, installed on the front panel in MS25010-2 red-filter light assemblies, for edge-lighting the panel. The C-44, C-47, and C-50 control units, used in dual-control installations, use the same type of lamp installed in a mechanical dimmer-type light assembly for indicating when control of the system has been transferred. For 14-volt operation, type 330 lamps are used. To replace any of these lamps, proceed as follows:

a. Unscrew the lamp housing, and remove together with the rubber grommet (if present) and the lamp.

b. With the thin edge of a knife blade (or the fingernails of the thumb and forefinger) inserted between the flange base of the lamp and the threaded bushing, withdraw the defective lamp.

c. Insert a new lamp, seating the flange of the base firmly against the threaded bushing.

d. Replace the lamp housing assembly, and screw in finger-tight.

4-8. REPLACEMENT OF FUSES. Some receivers contain a 20-ampere type 3AG cartridge fuse, installed in an extractor-type fuseholder located on the receiver front panel. If such fuses are installed, and replacement is required, proceed as follows:

a. Shut down power to component.

b. Rotate fuseholder cap a quarter-turn counterclockwise and remove the cap together with the fuse.

c. Remove the defective fuse.

d. Insert a new fuse of the proper rating in the cap, and replace the cap in the fuseholder body. Secure with a quarter-turn clockwise.

4-9. The J-12, J-13, and J-15 junction boxes each contain three type 3AG, 20-ampere cartridge fuses, installed in fuse-clip holders. To replace, shut down power, pull defective fuse out of clips, and insert a new one. The J-13A and J-15A junction boxes do not contain fuses.

4-10. LOCATION DIAGRAMS OF ELECTRON TUBES AND CRYSTALS.

4-11. Figures 4-1 through 4-10 locate and identify the electron tubes and crystals used in the components of Radio Set ARC Type 12.

4-12. SCHEMATIC DIAGRAMS.

4-13. Schematic diagrams of the electrical components of Radio Set ARC Type 12 are shown in figures 4-11 through 4-46.

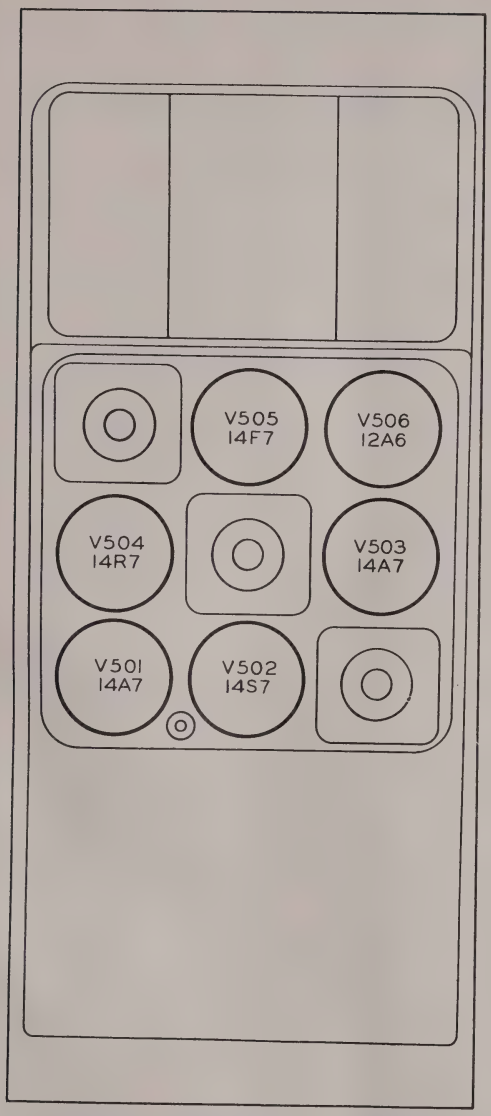


Figure 4-1. Radio Receiver ARC Type R-10A, Electron Tube Location Diagram

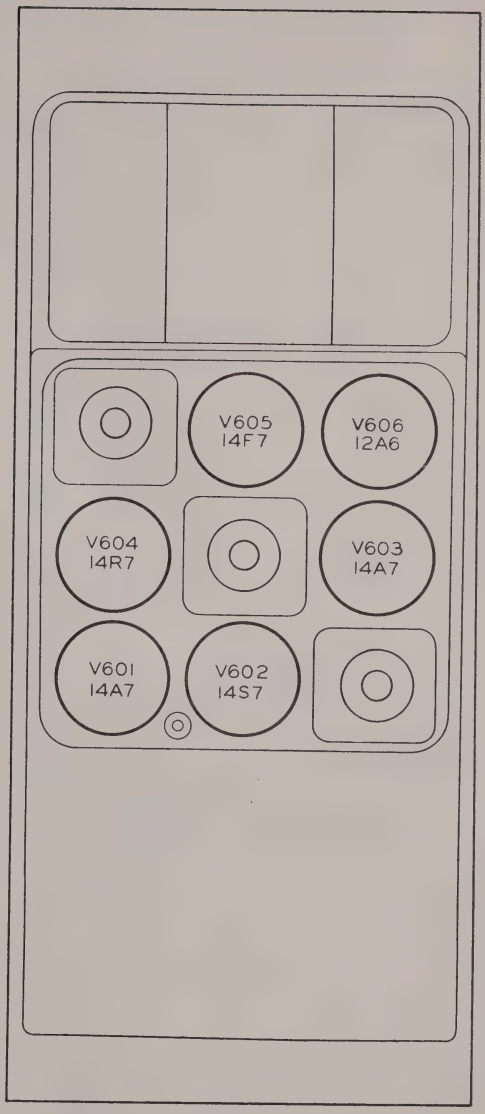


Figure 4-2. Radio Receiver ARC Type R-11A, Electron Tube Location Diagram

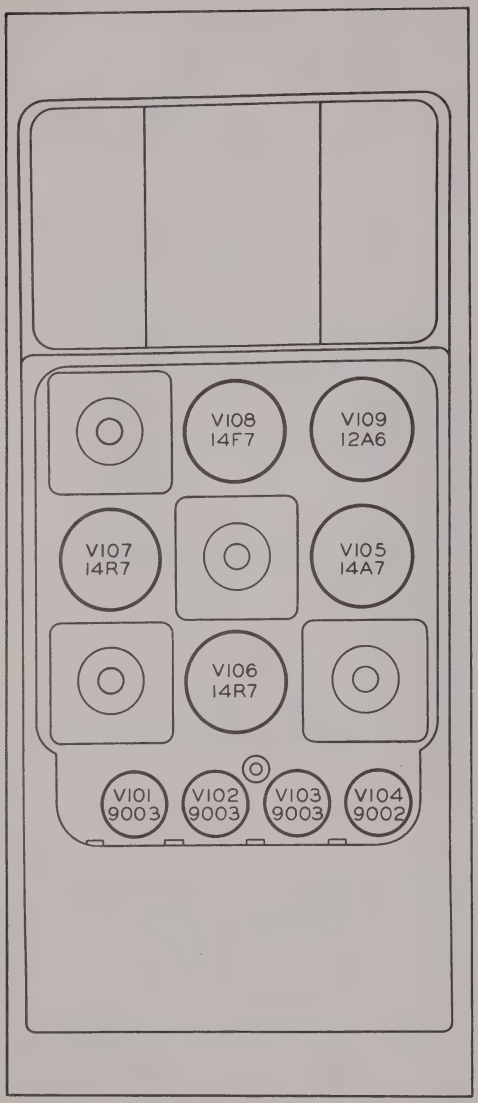


Figure 4-3. Radio Receiver ARC Type R-15, Electron Tube Location Diagram

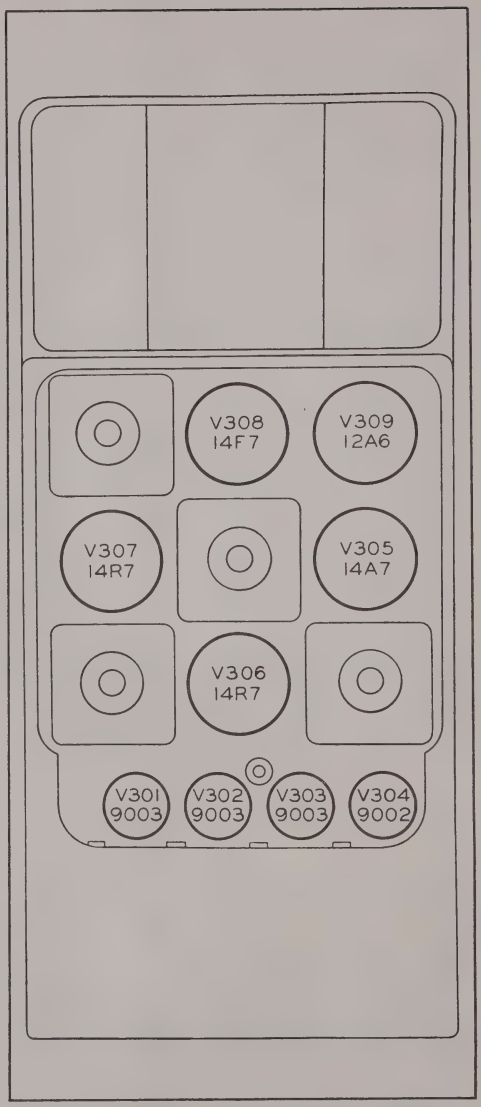


Figure 4-4. Radio Receiver ARC Type R-19, Electron Tube Location Diagram

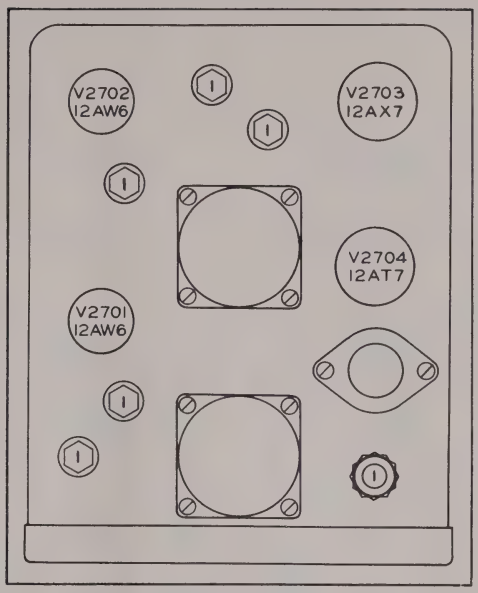


Figure 4-5. Radio Receiver ARC Type R-20, Electron Tube Location Diagram

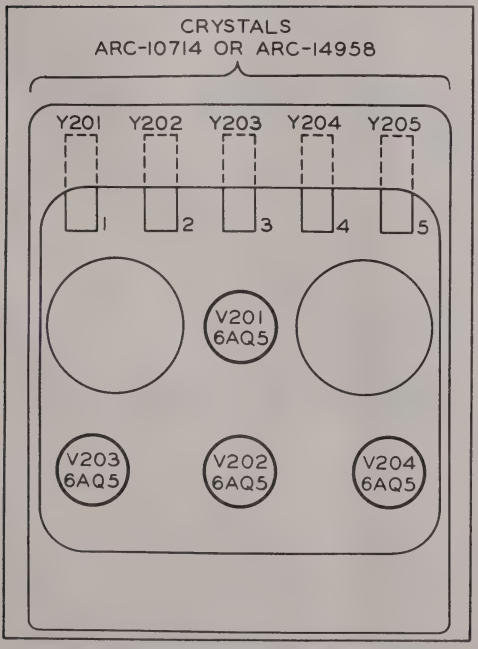


Figure 4-6. Radio Transmitter ARC Type T-11A, Electron Tube and Crystal Location Diagram

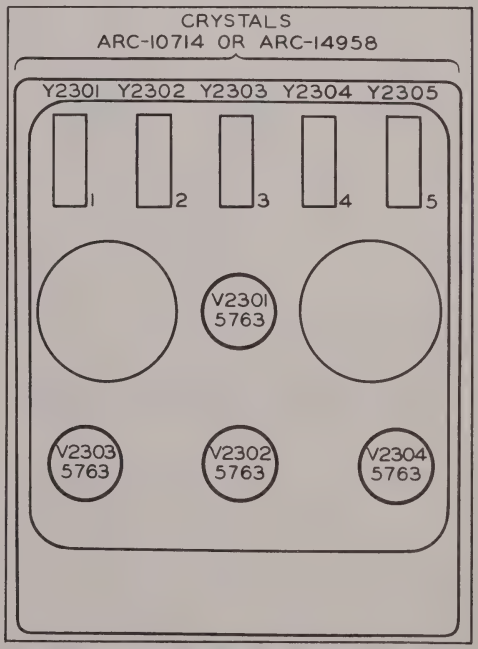


Figure 4-7. Radio Transmitter ARC Type T-11B, Electron Tube and Crystal Location Diagram

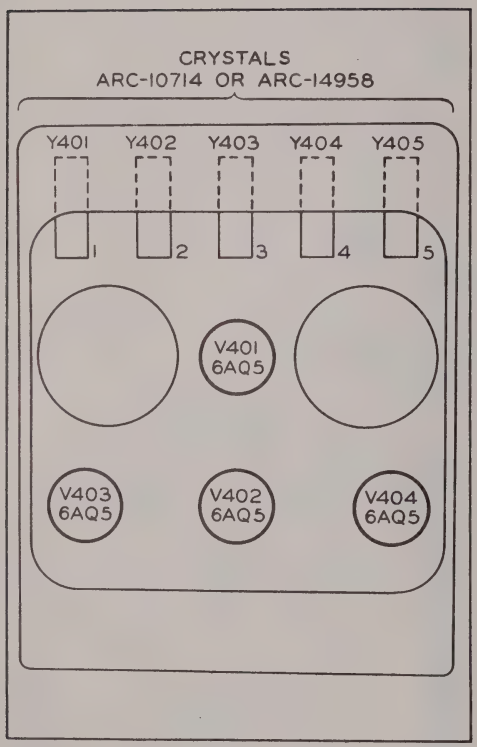


Figure 4-8. Radio Transmitter ARC Type T-13, Electron Tube and Crystal Location Diagram

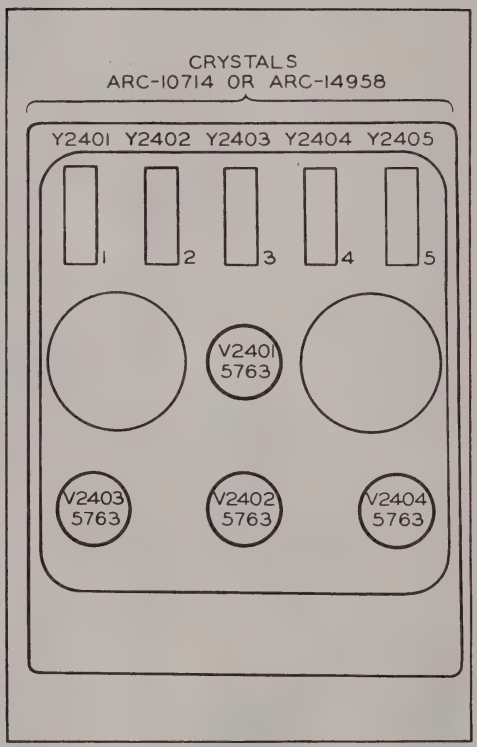


Figure 4-9. Radio Transmitter ARC Type T-13A, Electron Tube and Crystal Location Diagram

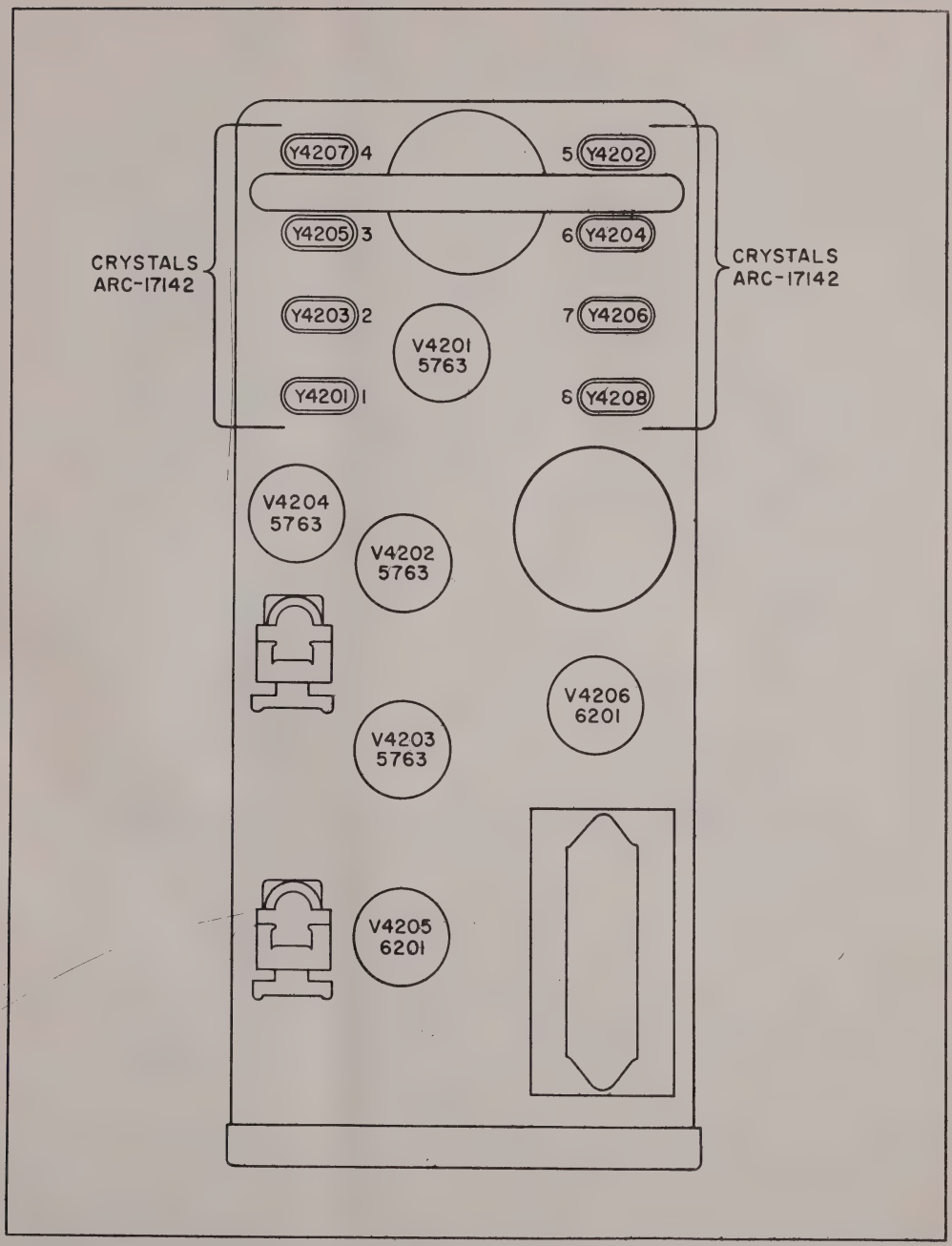
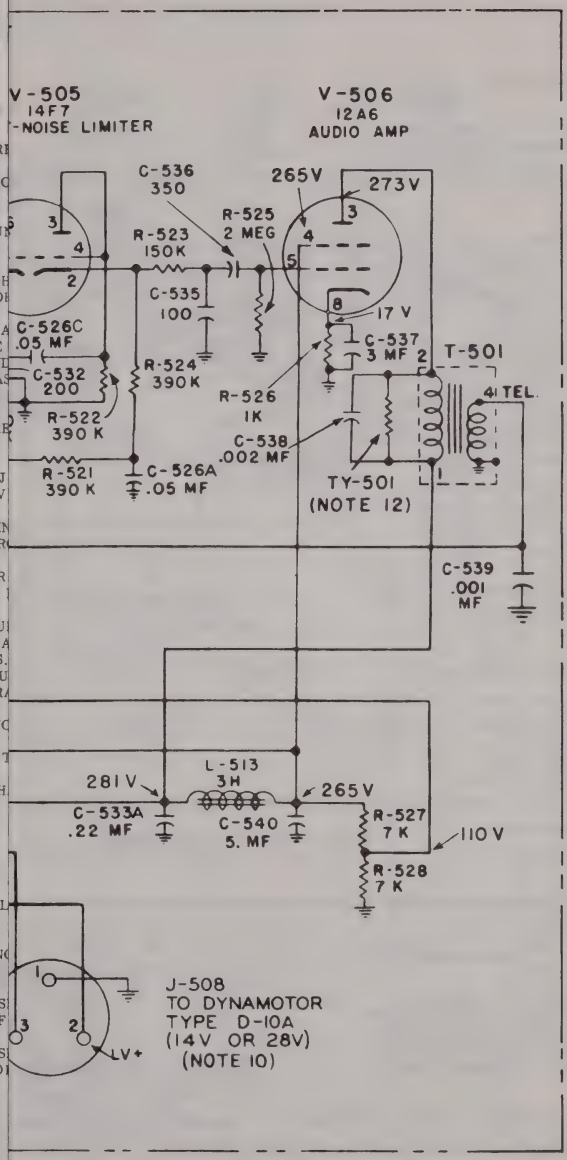


Figure 4-10. UHF Transverter ARC Type TV-10, Electron Tube and Crystal Location

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRE
2. CAPACITOR VALUES ARE IN MICRO BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS U K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICRO "MH" - MILLIHENRY (1,000 MICRO
5. A "SHORT" ANTENNA IS DEFINED A OF 21-50 MMF AND A "LONG" ONE SERIAL NO. 365 OF R-10A(14V) AN TERMINAL POST CONNECTION WA POST WAS MARKED "A".
6. D-C VOLTAGE VALUES SHOWN ARE FOLLOWING CONDITIONS:
   A. LV+ AT TERMINAL "2" OF J OR 27 VOLTS ON R-10A (28V
   B. AF CATHODE LINE, TERMIN TERMINAL "E" OF J-503 GR
   C. 20,000 OHMS-PER-VOLT OR USED, UNLESS OTHERWISE
   D. ALL VOLTAGES ARE MEASU VOLTAGE SUPPLY. WHEN A APPROXIMATELY 10% LESS. WHEN DYNAMOTOR ALSO SU TO J-506; NO RECEIVER DR
   E. NEGATIVE TERMINAL OF VO
7. THE I. F. IS 239 KC. ALL THE I-F T
8. EACH TUNING SECTION OF C-504 H ΔC OF 16 MMF.
9. SYMBOL NO. C-506 NOT USED.
10. REFER TO PARAGRAPH 1-43.
11. DELETED BEGINNING WITH SERIAL NO. 75 OF R-10A (28V).
12. ADDED BEGINNING WITH SERIAL NO OF R-10A (28V).
13. VALUE SHOWN IN PARENTHESIS US R-10A (14V) AND SERIAL NO. 75 OF
14. VALUE SHOWN IN PARENTHESIS US R-10A (14V) AND SERIAL NO. 210 O



511507 O - 59

Type R-10A, Schematic Diagram

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. A "SHORT" ANTENNA IS DEFINED AS ONE HAVING AN EFFECTIVE CAPACITANCE OF 21-50 MMF AND A "LONG" ONE AS 50 MMF OR GREATER. BEGINNING WITH SERIAL NO. 365 OF R-10A(14V) AND SERIAL NO. 75 OF R-10A (28V) "A" ANTENNA TERMINAL POST CONNECTION WAS DELETED AND "L" ANTENNA TERMINAL POST WAS MARKED "A".
6. D-C VOLTAGE VALUES SHOWN ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. LV+ AT TERMINAL "2" OF J-508 SET AT 13.5 VOLTS ON R-10A (14V) OR 27 VOLTS ON R-10A (28V) BY ADJUSTMENT OF LV+ SOURCE.
   B. AF CATHODE LINE, TERMINAL "B" OF J-502, AND SENSITIVITY LINE, TERMINAL "E" OF J-503 GROUNDED; NO SIGNAL INPUT.
   C. 20,000 OHMS-PER-VOLT OR 1,000 OHMS-PER-VOLT VOLTMETER USED, UNLESS OTHERWISE INDICATED.
   D. ALL VOLTAGES ARE MEASURED USING A D-10A DYNAMOTOR AS THE HIGH VOLTAGE SUPPLY. WHEN A D-10 DYNAMOTOR IS USED, VALUES WILL BE APPROXIMATELY 10% LESS. VALUES IN PARENTHESIS ARE THOSE OBTAINED WHEN DYNAMOTOR ALSO SUPPLIES POWER TO A TRANSMITTER CONNECTED TO J-506; NO RECEIVER DRAIN.
   E. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS.
7. THE I. F. IS 239 KC. ALL THE I-F TRIMMER CAPACITORS HAVE A ΔC OF 17 MMF.
8. EACH TUNING SECTION OF C-504 HAS A ΔC OF 346 MMF. EACH TRIMMER HAS A ΔC OF 16 MMF.
9. SYMBOL NO. C-506 NOT USED.
10. REFER TO PARAGRAPH 1-43.
11. DELETED BEGINNING WITH SERIAL NO. 365 OF R-10A (14V) AND SERIAL NO. 75 OF R-10A (28V).
12. ADDED BEGINNING WITH SERIAL NO. 365 OF R-10A (14V) AND SERIAL NO. 75 OF R-10A (28V).
13. VALUE SHOWN IN PARENTHESIS USED BEGINNING WITH SERIAL NO. 365 OF R-10A (14V) AND SERIAL NO. 75 OF R-10A (28V).
14. VALUE SHOWN IN PARENTHESIS USED BEGINNING WITH SERIAL NO. 437 OF R-10A (14V) AND SERIAL NO. 210 OF R-10A (28V).

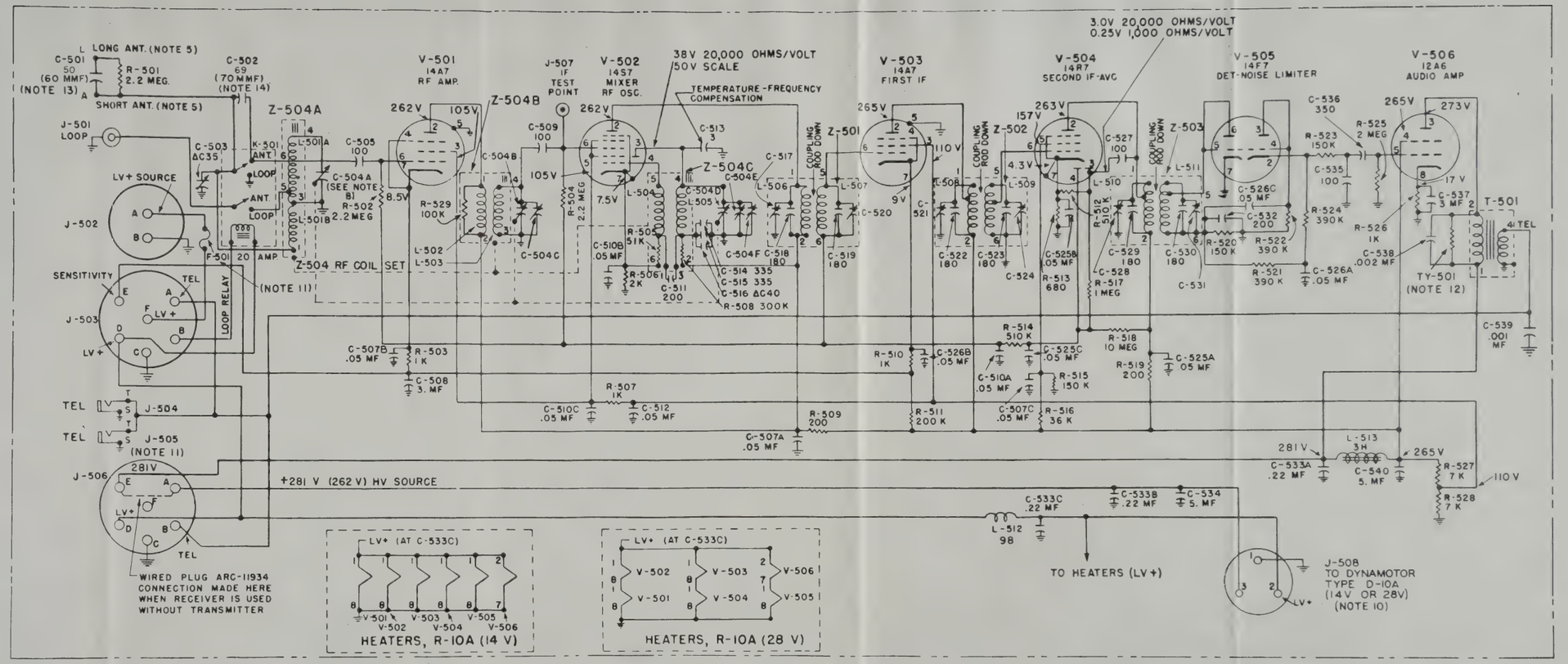
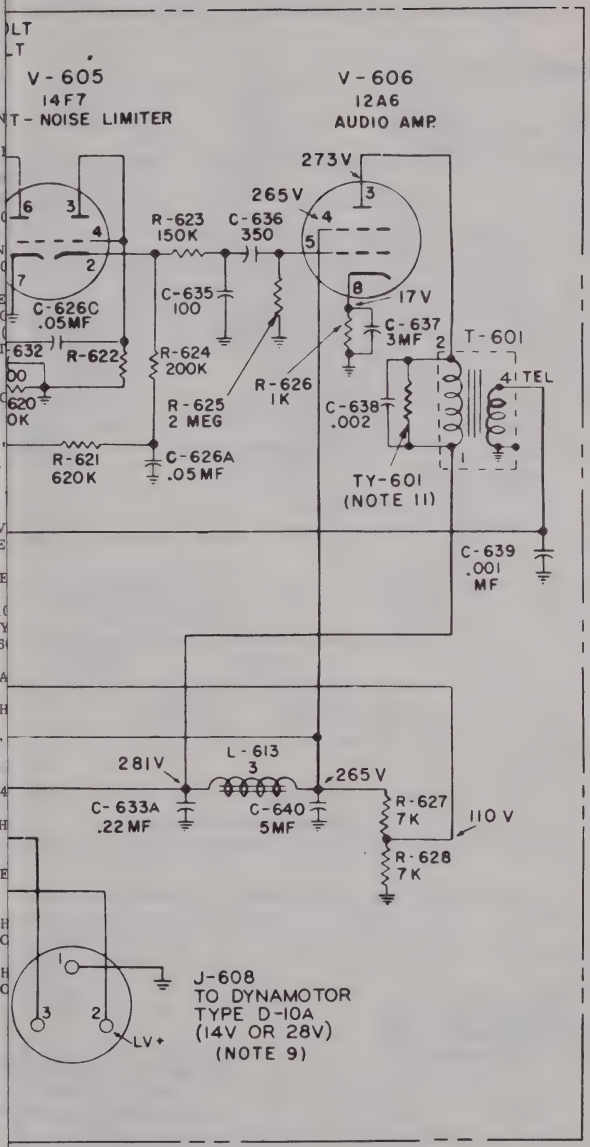


Figure 4-11. Radio Receiver ARC Type R-10A, Schematic Diagram

NOTES:

1. CONNECTIONS ARE SHOWN T - NOISE LIMITER
2. CAPACITOR VALUES ARE I BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN K = 1,000; MEG = 1,000,000
4. INDUCTOR VALUES ARE IN "MH" - MILLIHENRY (1,000
5. A "SHORT" ANTENNA IS DE OF 21-50 MMF AND A LONG SERIAL NO. 530 OF R-11A (TERMINAL POST CONNECT WAS MARKED "A".
6. D-C VOLTAGE VALUES SHO FOLLOWING CONDITIONS:
   A. LV+ AT TERMINAL 27 VOLTS ON R-11A
   B. SENSITIVITY LINE,
   C. 20,000 OHMS-PER-V UNLESS OTHERWISE
   D. ALL VOLTAGES ARE VOLTAGE SUPPLY. APPROXIMATELY 1 OBTAINED WHEN DY CONNECTED TO J-6
   E. NEGATIVE TERMINA
7. THE I. F. IS 85 KC. ALL TH
8. EACH TUNING SECTION OF Δ C OF 16 MMF.
9. REFER TO PARAGRAPH 1-4
10. DELETED BEGINNING WITH OF R-11A (28V).
11. ADDED BEGINNING WITH SE OF R-11A (28V).
12. VALUE SHOWN IN PARENTH R-11A (14V) AND SERIAL NO
13. VALUE SHOWN IN PARENTH R-11A (14V) AND SERIAL NO



511507 O-59

RC Type R-11A, Schematic Diagram

B. ALL VOLTAGES ARE MEASURED FROM [illegible]

C. 20,000 OHMS-PER-VOLT DC [illegible] 20 OHMS-PER VOLT AC UNLESS OTHERWISE INDICATED.

D. ALL VOLTAGES ARE MEASURED FROM [illegible]

8. EACH TUNING SECTION OF C-564 HAS A .05 OR 396 MFD. 3 KOH CONNECTED AS A .05 OR 15 MMF.

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. A "SHORT" ANTENNA IS DEFINED AS ONE HAVING AN EFFECTIVE CAPACITANCE OF 21-50 MMF AND A LONG ONE AS 50 MMF OR GREATER. BEGINNING WITH SERIAL NO. 530 OF R-11A (14V) AND SERIAL NO. 405 OF R-11A (28V) "A" ANTENNA TERMINAL POST CONNECTION WAS DELETED AND "L" ANTENNA TERMINAL POST WAS MARKED "A".
6. D-C VOLTAGE VALUES SHOWN ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. LV+ AT TERMINAL "2" OF J-608 SET AT 13.5 VOLTS ON R-11A (14V) OR 27 VOLTS ON R-11A (28V) BY ADJUSTMENT OF LV+ SOURCE.
   B. SENSITIVITY LINE, TERMINAL "E" OF J-603 GROUNDED; NO SIGNAL INPUT.
   C. 20,000 OHMS-PER-VOLT OR 1,000 OHMS-PER-VOLT VOLTMETER USED, UNLESS OTHERWISE INDICATED.
   D. ALL VOLTAGES ARE MEASURED USING A D-10A DYNAMOTOR AS THE HIGH VOLTAGE SUPPLY. WHEN A D-10 DYNAMOTOR IS USED, VALUES WILL BE APPROXIMATELY 10 PERCENT LESS. VALUES IN PARENTHESIS ARE THOSE OBTAINED WHEN DYNAMOTOR ALSO SUPPLIES POWER TO A TRANSMITTER CONNECTED TO J-606; NO RECEIVER DRAIN.
   E. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS.
7. THE I. F. IS 85 KC. ALL THE I-F TRIMMER CAPACITORS HAVE A ΔC OF 17 MMF.
8. EACH TUNING SECTION OF C-604 HAS A ΔC OF 346 MMF. EACH TRIMMER HAS A Δ C OF 16 MMF.
9. REFER TO PARAGRAPH 1-43.
10. DELETED BEGINNING WITH SERIAL NO. 530 OF R-11A (14V) AND SERIAL NO. 1405 OF R-11A (28V).
11. ADDED BEGINNING WITH SERIAL NO. 530 OF R-11A (14V) AND SERIAL NO. 1405 OF R-11A (28V).
12. VALUE SHOWN IN PARENTHESIS USED BEGINNING WITH SERIAL NO. 530 OF R-11A (14V) AND SERIAL NO. 1405 OF R-11A (28V).
13. VALUE SHOWN IN PARENTHESIS USED BEGINNING WITH SERIAL NO. 560 OF R-11A (14V) AND SERIAL NO. 6794 OF R-11A (28V).

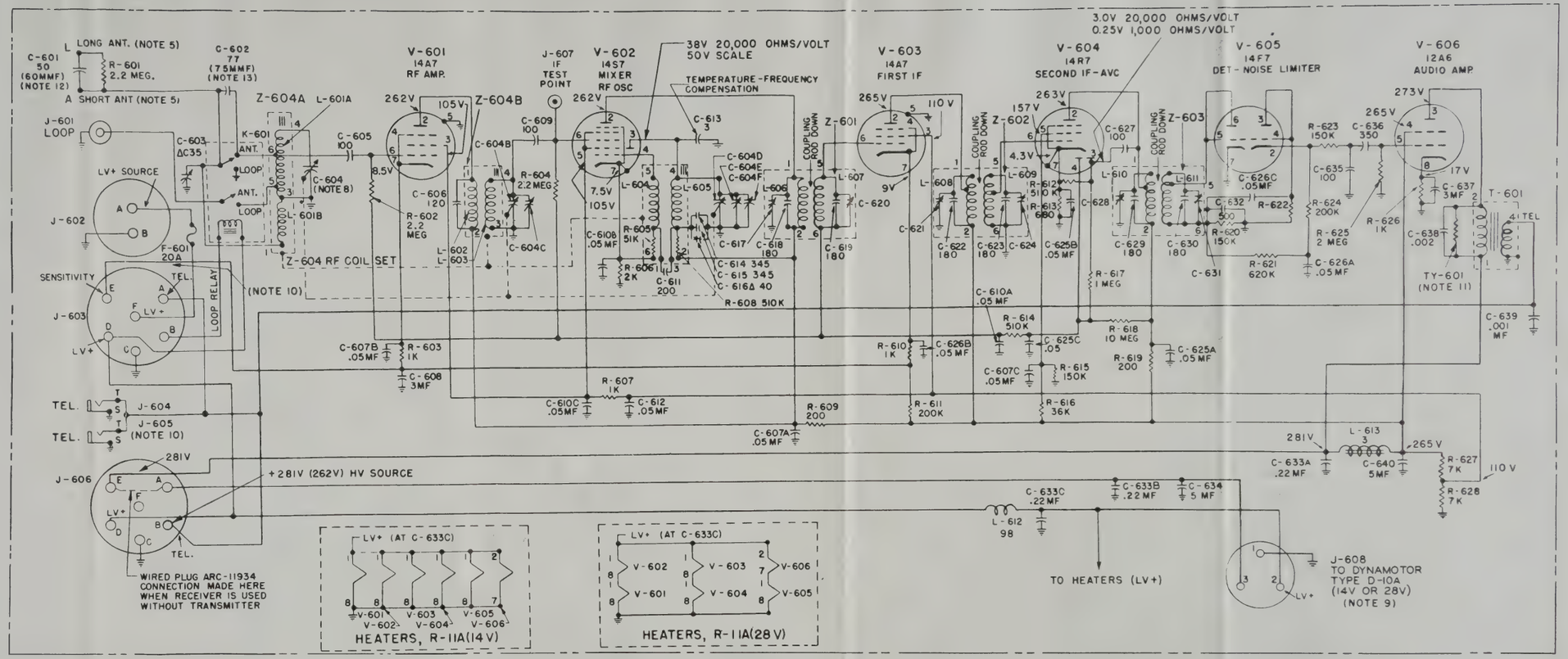


Figure 4-12. Radio Receiver ARC Type R-11A, Schematic Diagram

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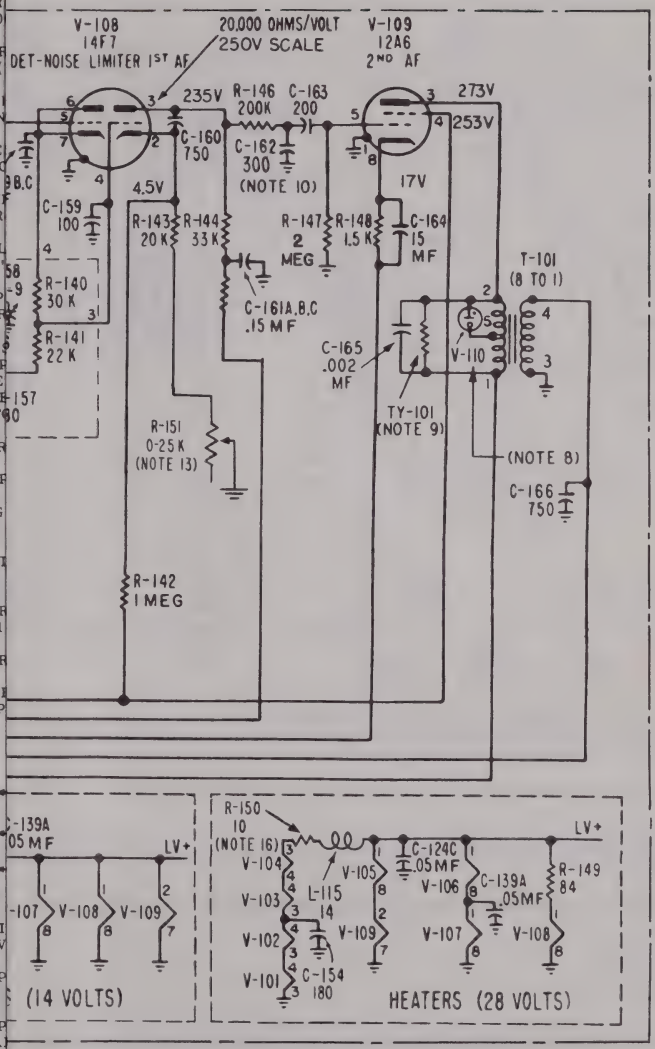
NOTES:

1. CONNECTIONS ARE SH
2. CAPACITOR VALUES A "MF" - MICROFARAD.
3. RESISTOR VALUES AR K = 1,000; MEG = 1,00
4. INDUCTOR VALUES AR "MH" - MILLIHENRY (
5. THE I. F. IS 15 MC. TI R-F SIGNAL FREQUEN
6. D-C VOLTAGE VALUE FOLLOWING CONDITIO
   A. LV+ AT TERMIF 27 VOLTS ON R
   B. AF CATHODE L TERMINAL "E"
   C. 20,000 OHMS-P UNLESS OTHER
   D. ALL VOLTAGES VOLTAGE SUPP APPROXIMATE OBTAINED WHE CONNECTED T
   E. NEGATIVE TER
7. REFER TO PARAGRAP
8. DELETED BEGINNING 1061 OF R-15 (28V).
9. ADDED BEGINNING WI 1061 OF R-15 (28V).
10. VALUE SHOWN IN PAR AND SERIAL NO. 1061
11. VALUE SHOWN IN PAR
12. VALUE SHOWN USED I 2026 OF R-15 (28V). P
13. ADDED BEGINNING WI NO. 2540 OF R-15 (28V
14. VOLTAGE SHOWN IN P R-15 (28V).
15. VOLTAGE SHOWN IN P R-15 (14V) AND SERIA
16. ADDED BEGINNING WI 2426 OF R-15 (28V).
17. DELETED BEGINNING 2426 OF R-15 (28V).



Type R-15, Schematic Diagram

511507 O - 59

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. THE I. F. IS 15 MC. THE R-F OSCILLATOR FREQUENCY IS 15 MC LESS THAN THE R-F SIGNAL FREQUENCY.
6. D-C VOLTAGE VALUES SHOWN ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. LV+ AT TERMINAL "2" OF J-108 SET AT 13.5 VOLTS ON R-15 (14V) OR 27 VOLTS ON R-15 (28V) BY ADJUSTMENT OF LV+ SOURCE.
   B. AF CATHODE LINE, TERMINAL "B" OF J-102, AND SENSITIVITY LINE, TERMINAL "E" OF J-102 GROUNDED; NO SIGNAL INPUT.
   C. 20,000 OHMS-PER-VOLT OR 1,000 OHMS-PER-VOLT VOLTMETER USED, UNLESS OTHERWISE INDICATED.
   D. ALL VOLTAGES ARE MEASURED USING A D-10A DYNAMOTOR AS THE HIGH VOLTAGE SUPPLY. WHEN A D-10 DYNAMOTOR IS USED, VALUES WILL BE APPROXIMATELY 10 PERCENT LESS. VALUES IN PARENTHESIS ARE THOSE OBTAINED WHEN DYNAMOTOR SUPPLIES 130 MA TO A TRANSMITTER CONNECTED TO J-103; NO RECEIVER DRAIN.
   E. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS.
7. REFER TO PARAGRAPH 1-43.
8. DELETED BEGINNING WITH SERIAL NO. 700 OF R-15 (14V) AND SERIAL NO. 1061 OF R-15 (28V).
9. ADDED BEGINNING WITH SERIAL NO. 700 OF R-15 (14V) AND SERIAL NO. 1061 OF R-15 (28V).
10. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 700 OF R-15 (14V) AND SERIAL NO. 1061 OF R-15 (28V).
11. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 1822 OF R-15 (28V).
12. VALUE SHOWN USED BEFORE SERIAL NO. 800 OF R-15 (14V) AND SERIAL NO. 2026 OF R-15 (28V). PRESENT VALUE AND WIRING CONNECTION SHOWN BELOW:

13. ADDED BEGINNING WITH SERIAL NO. 825 OF R-15 (14V) AND SERIAL NO. 2540 OF R-15 (28V).
14. VOLTAGE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 1822 OF R-15 (28V).
15. VOLTAGE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 800 OF R-15 (14V) AND SERIAL NO. 2026 OF R-15 (28V).
16. ADDED BEGINNING WITH SERIAL NO. 825 OF R-15 (14V) AND SERIAL NO. 2426 OF R-15 (28V).
17. DELETED BEGINNING WITH SERIAL NO. 825 OF R-15 (14V) AND SERIAL NO. 2426 OF R-15 (28V).

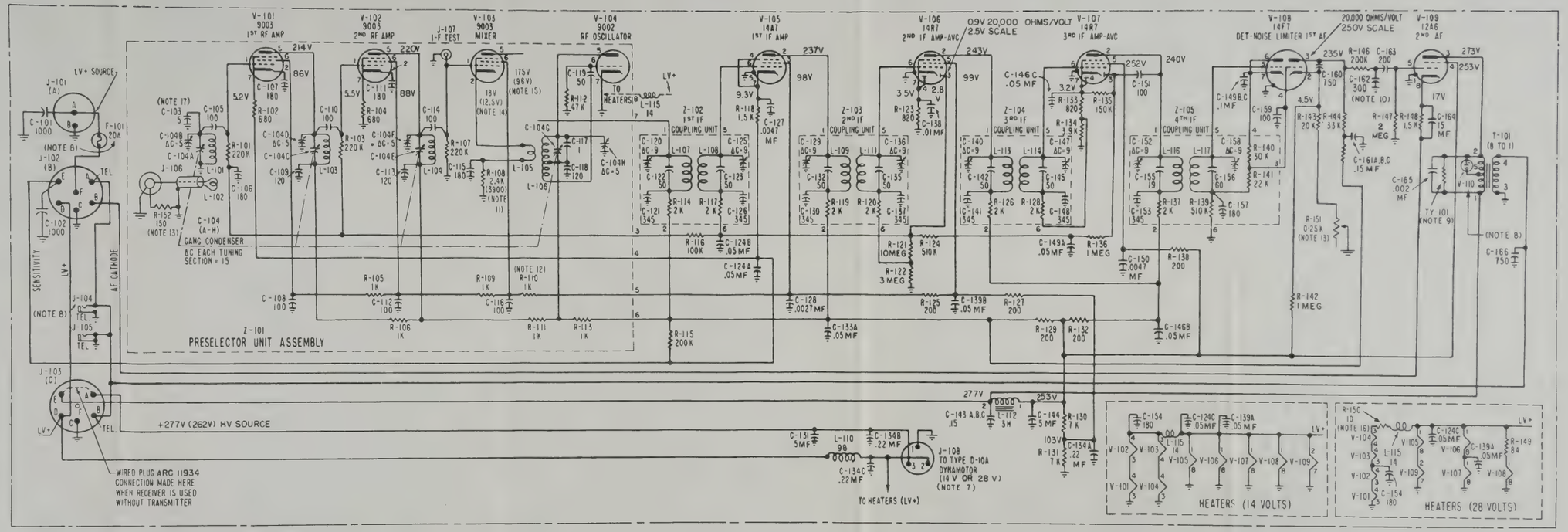
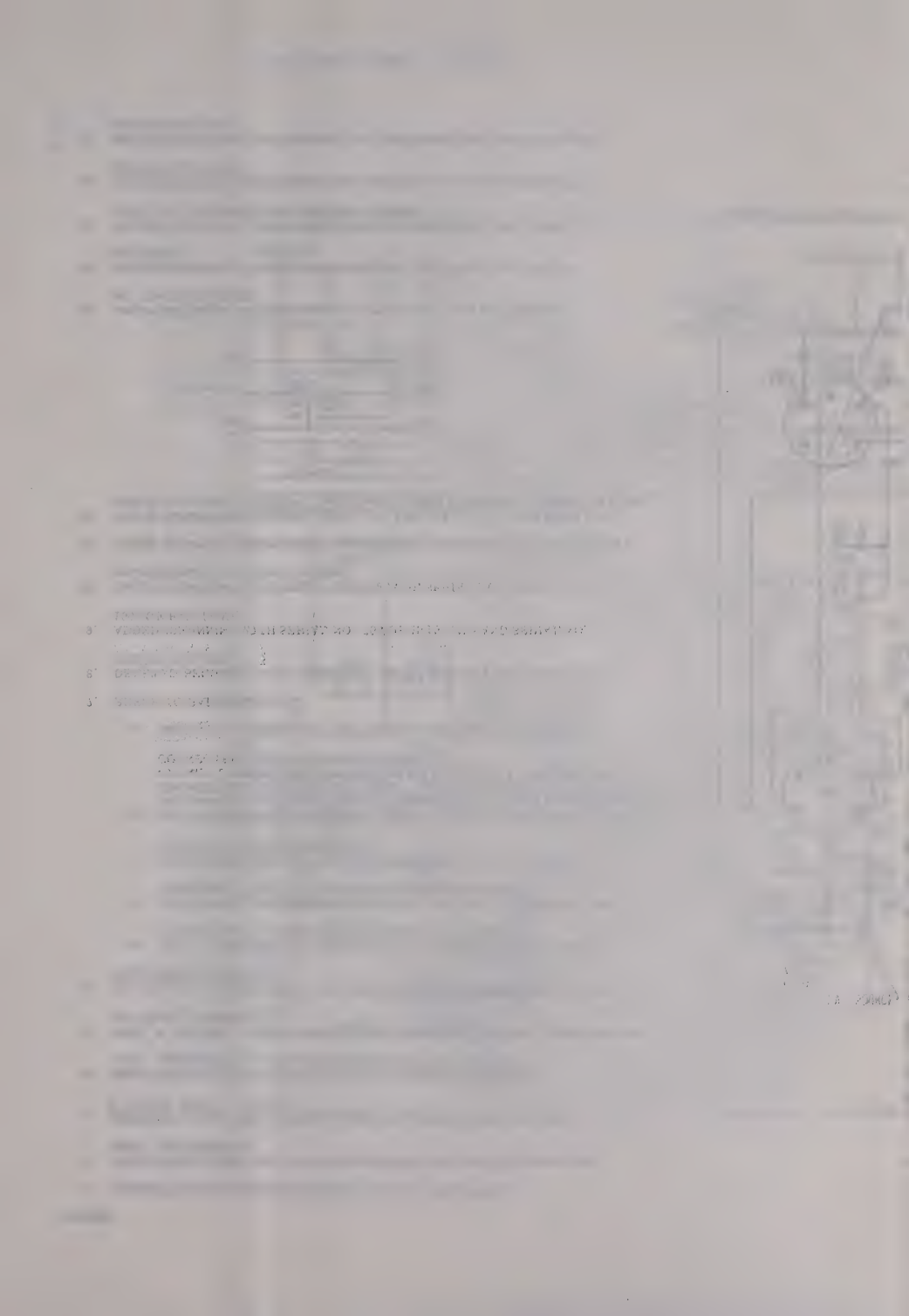


Figure 4-13. Radio Receiver ARC Type R-15, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SH
2. CAPACITOR VALUES A BY "MF" - MICROFAR
3. RESISTOR VALUES AR K = 1,000; M = 1,000,
4. INDUCTOR VALUES AR "MH" - MILLIHENRY (
5. THE I. F. IS 15 MC. T THAN THE R-F SIGNA
6. D-C VOLTAGE VALUE THE FOLLOWING CON
   A. LV+ AT TERMI OR 27 VOLTS O
   B. AF CATHODE L LINE, TERMINA
   C. 20,000 OHMS-P
   D. ALL VOLTAGES VOLTAGE SUPP BE APPROXIMA ARE THOSE OB TRANSMITTER
   E. NEGATIVE TER
7. DELETED BEGINNING NO. 780 OF R-19 (28V).
8. ADDED BEGINNING WI 780 OF R-19 (28V).
9. VALUE SHOWN IN PAR AND SERIAL NO. 780 O
10. VALUE SHOWN IN PAR R-19 (14V) AND SERIAL
11. ADDED BEGINNING WI 7440 OF R-19 (28V).
12. DELETED BEGINNING 7440 OF R-19 (28V).
13. ADDED BEGINNING WI NO. 7141 OF R-19 (28V

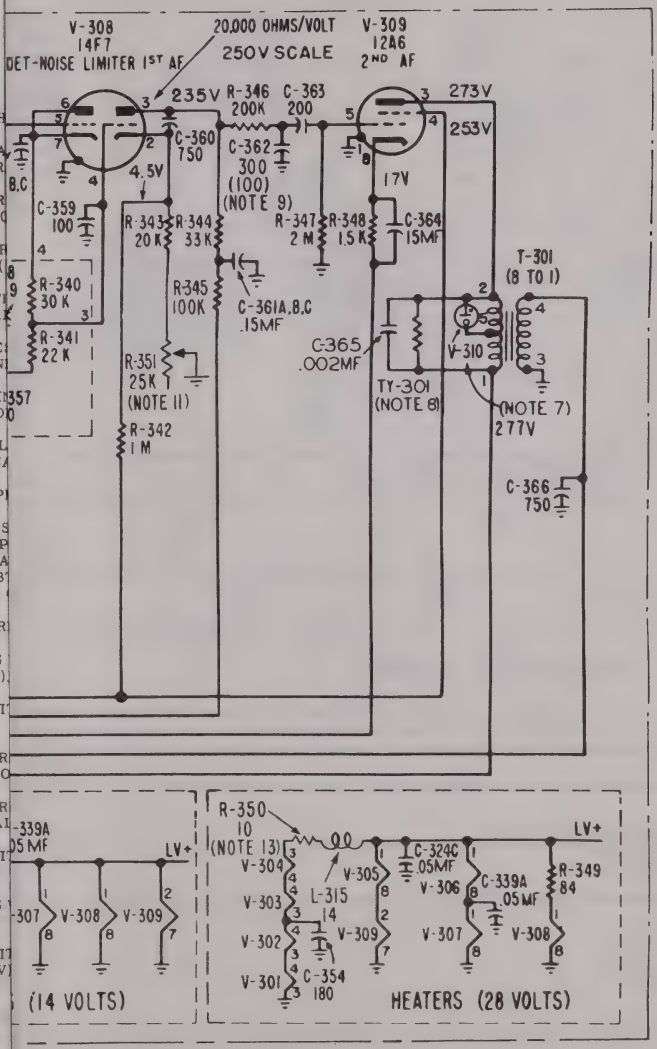


Figure 4-14. Radio Receiver ARC Type R-19, Schematic Diagram

511507 O - 59

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; M = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. THE I.F. IS 15 MC. THE R-F OSCILLATOR FREQUENCY IS 15 MC LESS THAN THE R-F SIGNAL FREQUENCY.
6. D-C VOLTAGE VALUES SHOWN ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. LV+ AT TERMINAL "2" OF J-308 SET AT 13.5 VOLTS ON R-19 (14V) OR 27 VOLTS ON R-19 (28V) BY ADJUSTMENT OF LV+ SOURCE.
   B. AF CATHODE LINE, TERMINAL "B" OF J-302, AND SENSITIVITY LINE, TERMINAL "E" OF J-302 GROUNDED; NO SIGNAL INPUT.
   C. 20,000 OHMS-PER-VOLT OR 1,000 OHMS-PER-VOLT VOLTMETER USED.
   D. ALL VOLTAGES ARE MEASURED USING A D-10A DYNAMOTOR AS HIGH VOLTAGE SUPPLY. WHEN A D-10 DYNAMOTOR IS USED, VALUES WILL BE APPROXIMATELY 10 PERCENT LESS. VALUES IN PARENTHESIS ARE THOSE OBTAINED WHEN DYNAMOTOR SUPPLIES POWER TO A TRANSMITTER CONNECTED TO J-303; NO RECEIVER DRAIN.
   E. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS.
7. DELETED BEGINNING WITH SERIAL NO. 51 OF R-19 (14V) AND SERIAL NO. 780 OF R-19 (28V).
8. ADDED BEGINNING WITH SERIAL NO. 51 OF R-19 (14V) AND SERIAL NO. 780 OF R-19 (28V).
9. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 51 OF R-19 (14V) AND SERIAL NO. 780 OF R-19 (28V).
10. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 377 OF R-19 (14V) AND SERIAL NO. 7440 OF R-19 (28V).
11. ADDED BEGINNING WITH SERIAL NO. 377 OF R-19 (14V) AND SERIAL NO. 7440 OF R-19 (28V).
12. DELETED BEGINNING WITH SERIAL NO. 377 OF R-19 (14V) AND SERIAL NO. 7440 OF R-19 (28V).
13. ADDED BEGINNING WITH SERIAL NO. 151 OF R-19 (14V) AND SERIAL NO. 7141 OF R-19 (28V).

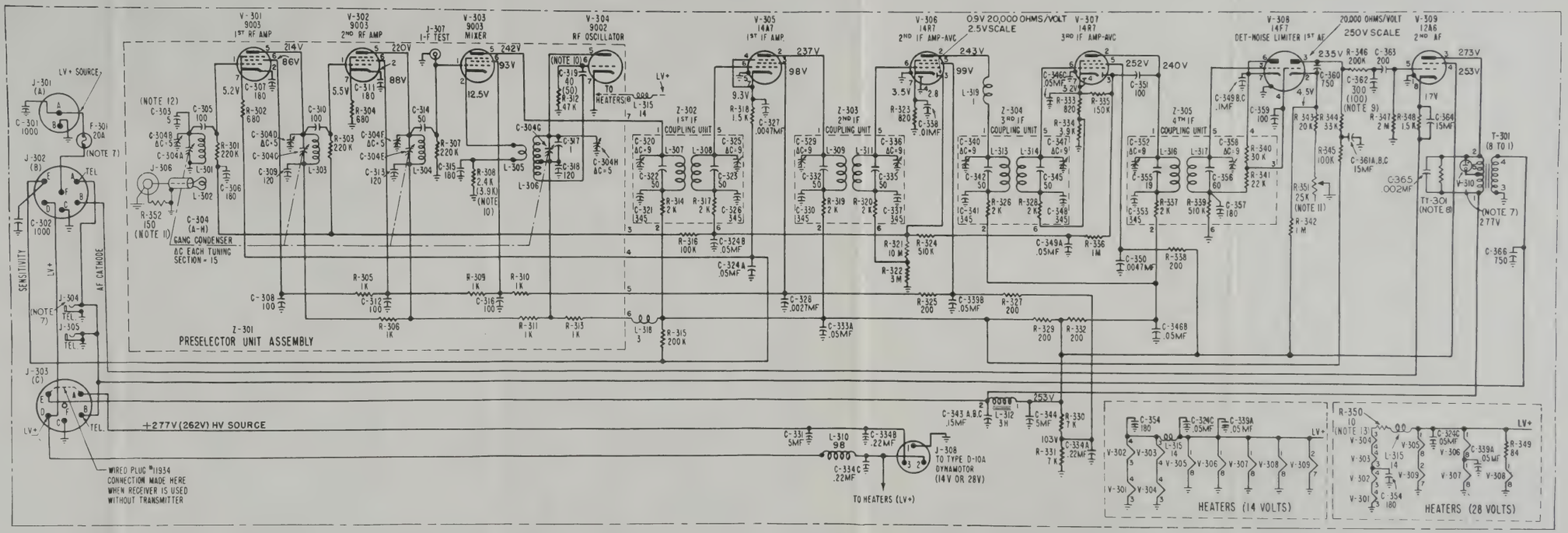
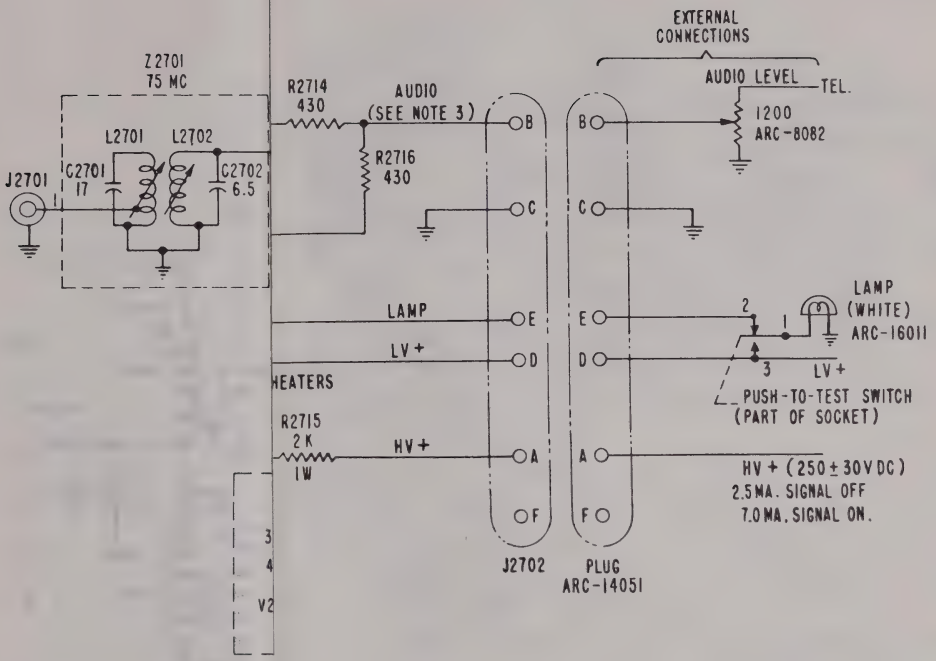


Figure 4-14. Radio Receiver ARC Type R-19, Schematic Diagram



NOTES:

1. CAPACITOR V
BY "MF" - MI

2. RESISTOR VA
K = 1,000; ME

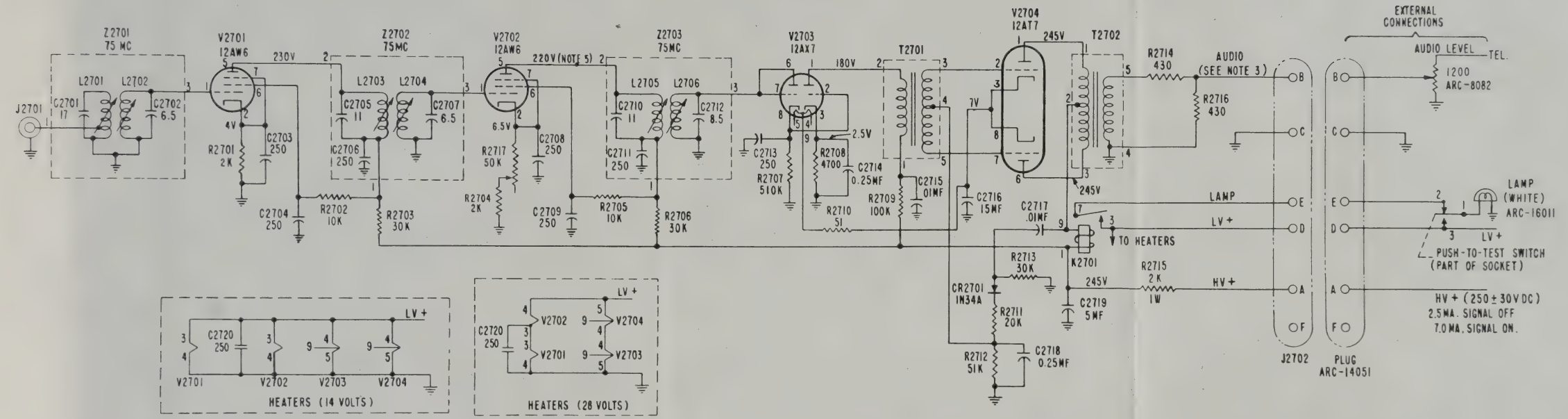
3. WITH NO EXT
IS APPROXIM
WITH 400 CYC
THE RELAY.
HIGH VOLTAC

4. D-C VOLTAGI
WITH A VOLT
AND WITH NO

5. VOLTAGE AT
BETWEEN 17

511507 O - 59

Figure 4-15. Radio Receiver ARC Type R-20, Schematic Diagram



NOTES:

1. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. WITH NO EXTERNAL LOAD ON TERMINAL "B" OF J2702, THE AUDIO OUTPUT IS APPROXIMATELY 5.5 V AC WHEN AN INPUT SIGNAL, MODULATED 30 PERCENT WITH 400 CYCLES, IS APPLIED AT A LEVEL JUST SUFFICIENT TO OPERATE THE RELAY. OTHER VOLTAGES SHOWN ARE DC, AND ARE OBTAINED WHEN HIGH VOLTAGE IS EQUAL TO 250 V, AND WITH NO INPUT SIGNAL.
4. D-C VOLTAGES ARE APPROXIMATE VOLTAGES TO GROUND AS MEASURED WITH A VOLTMETER HAVING A RESISTANCE OF 20,000 OHMS-PER-VOLT AND WITH NO SIGNAL INPUT TO THE RECEIVER.
5. VOLTAGE AT THIS POINT IS DEPENDENT ON SETTING OF R2717 AND MAY BE BETWEEN 170 AND 230 VOLTS.

Figure 4-15. Radio Receiver ARC Type R-20, Schematic Diagram

511507 O - 59

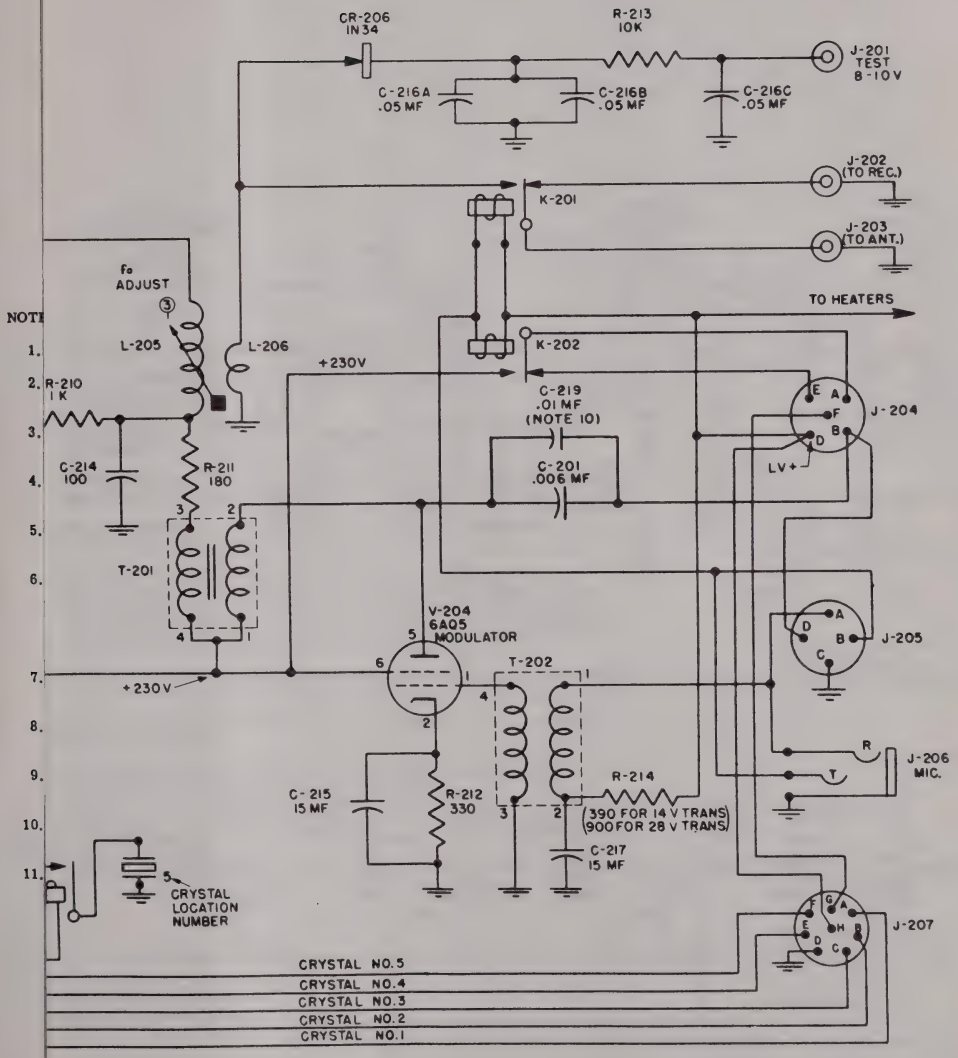


Figure 4-16. Radio Transmitter ARC Type T-11A, Schematic Diagram

511507 O - 59

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. ALL RELAYS ARE SHOWN UNENERGIZED. FOR KEYED RELAYS K-201 AND K-202 THIS IS THE STANDBY POSITION.
6. D-C VOLTAGES SHOWN ARE FOR THE TRANSMIT POSITION AND ARE OBTAINED WITH A 20,000 OHMS-PER-VOLT VOLTMETER AND WITH LV+ SET AT THE NOMINAL SUPPLY VOLTAGE OF 14 VOLTS OR 28 VOLTS. ALL VOLTAGES ARE APPROXIMATE AND WILL BE A LITTLE HIGHER FOR THE 28-VOLT EQUIPMENT THAN FOR THE 14-VOLT EQUIPMENT.
7. VALUE SHOWN IN PARENTHESIS USED BEGINNING WITH SERIAL NO. 1001 OF T-11A (14V) AND SERIAL NO. 701 OF T-11A (28V).
8. ADDED BEGINNING WITH SERIAL NO. 1001 OF T-11A (14V) AND SERIAL NO. 701 OF T-11A (28V).
9. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 1420 OF T-11A (14V) AND SERIAL NO. 2780 OF T-11A (28V).
10. ADDED BEGINNING WITH SERIAL NO. 1420 OF T-11A (14V) AND SERIAL NO. 2780 OF T-11A (28V).
11. fo = OUTPUT FREQUENCY.

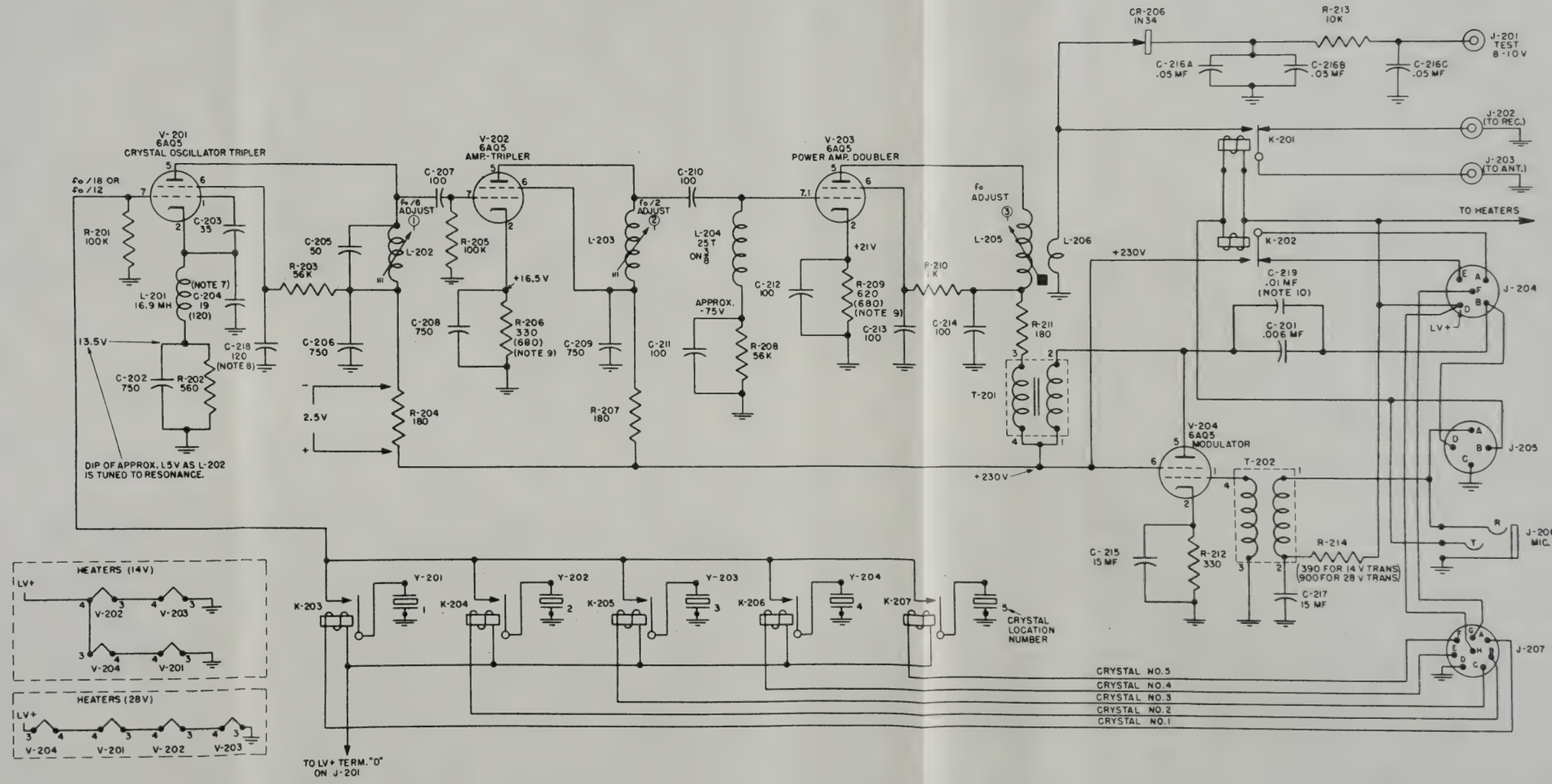
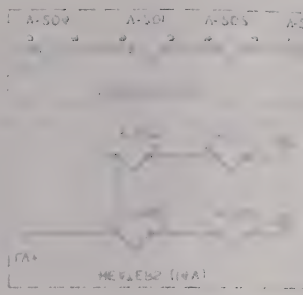
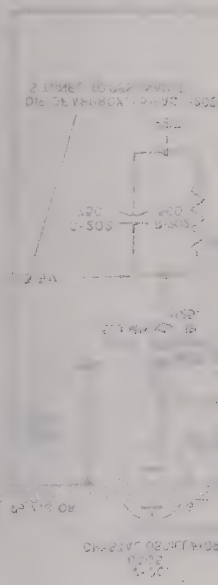
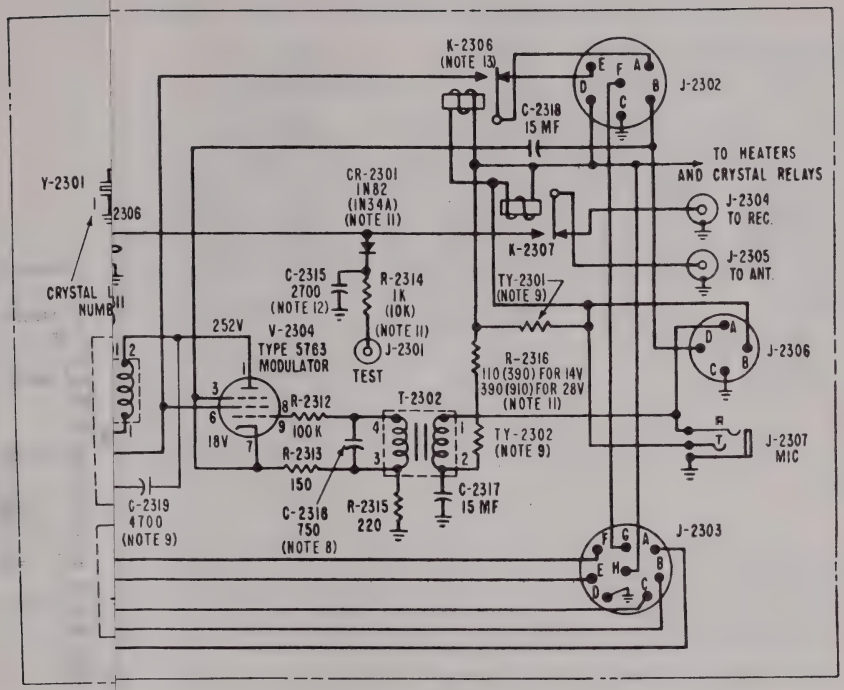


Figure 4-16. Radio Transmitter ARC Type T-11A, Schematic Diagram







13. WIRING CONNECTION BEGINNING WITH SERIAL NO. 151 OF T-11B (14V) AND SERIAL NO. 6323 OF T-11B (28V) SHOWN BELOW:

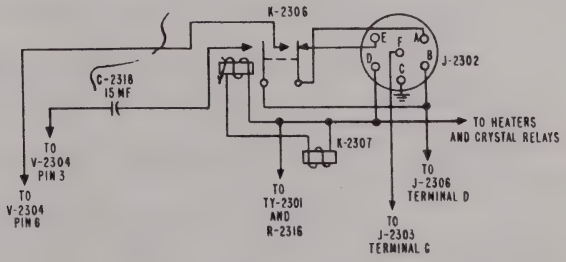
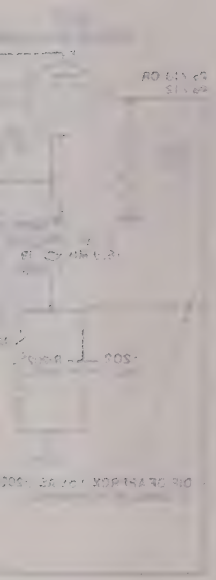
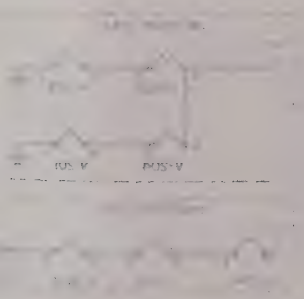
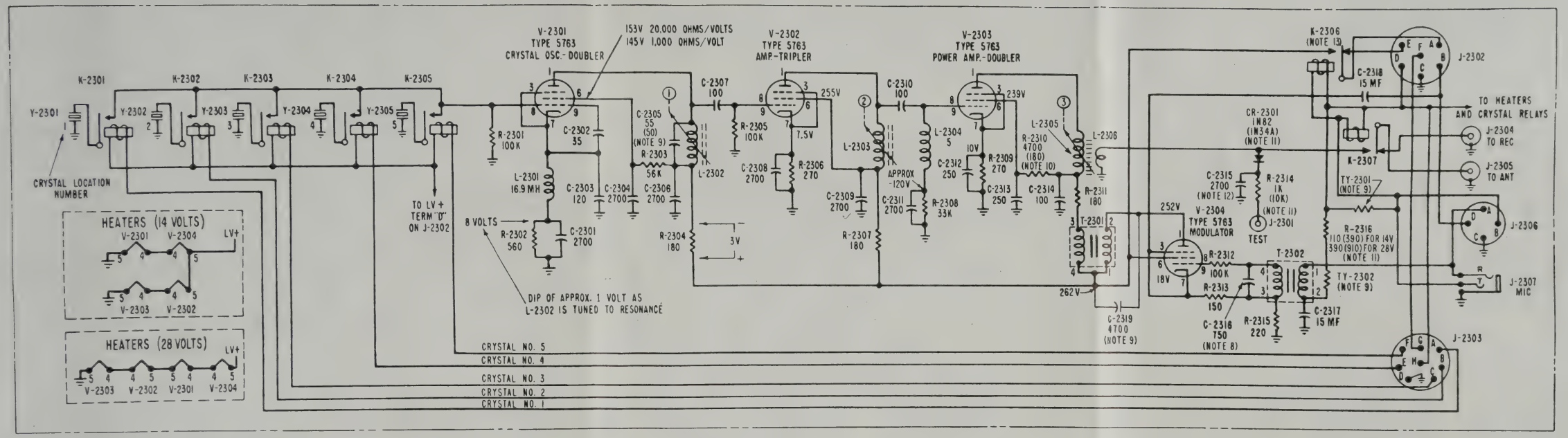


Figure 4-17. Radio Transmitter ARC Type T-11B, Schematic Diagram

511507 O - 59

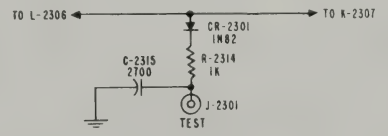






NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. ALL RELAYS ARE SHOWN UNENERGIZED. FOR KEYED RELAYS K-2306 AND K-2307 THIS IS THE STANDBY POSITION.
6. D-C VOLTAGE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS EXCEPT WHERE A DIFFERENT CONNECTION IS INDICATED.
   B. LV+ AT INPUT TERMINAL OF TYPE D-10A DYNAMOTOR ON RECEIVER SET AT 13.5 VOLTS FOR T-11B (14V) OR 27 VOLTS FOR T-11B (28V).
   C. VOLTMETER OHMS-PER-VOLT: EITHER 1,000 OR 20,000 EXCEPT WHERE SPECIFICALLY INDICATED.
7. DELETED BEGINNING WITH SERIAL NO. 304 OF T-11B (14V) AND SERIAL NO. 6323 OF T-11B (28V).
8. ADDED BEGINNING WITH SERIAL NO. 304 OF T-11B (14V) AND SERIAL NO. 6323 OF T-11B (28V).
9. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 51 OF T-11B (14V) AND SERIAL NO. 1621 OF T-11B (28V).
10. VALUE SHOWN USED BEGINNING WITH SERIAL NO. 4615. VALUE SHOWN IN PARENTHESIS USED ON SERIAL NO. 4403 - 4614 ONLY OF T-11B (28V).
11. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 304 OF T-11B (14V) AND SERIAL NO. 6323 OF T-11B (28V).
12. WIRING CONNECTION BEGINNING WITH SERIAL NO. 304 OF T-11B (14V) AND SERIAL NO. 6323 OF T-11B (28V) SHOWN BELOW:



13. WIRING CONNECTION BEGINNING WITH SERIAL NO. 151 OF T-11B (14V) AND SERIAL NO. 6323 OF T-11B (28V) SHOWN BELOW:

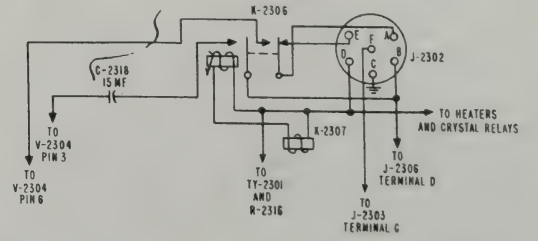
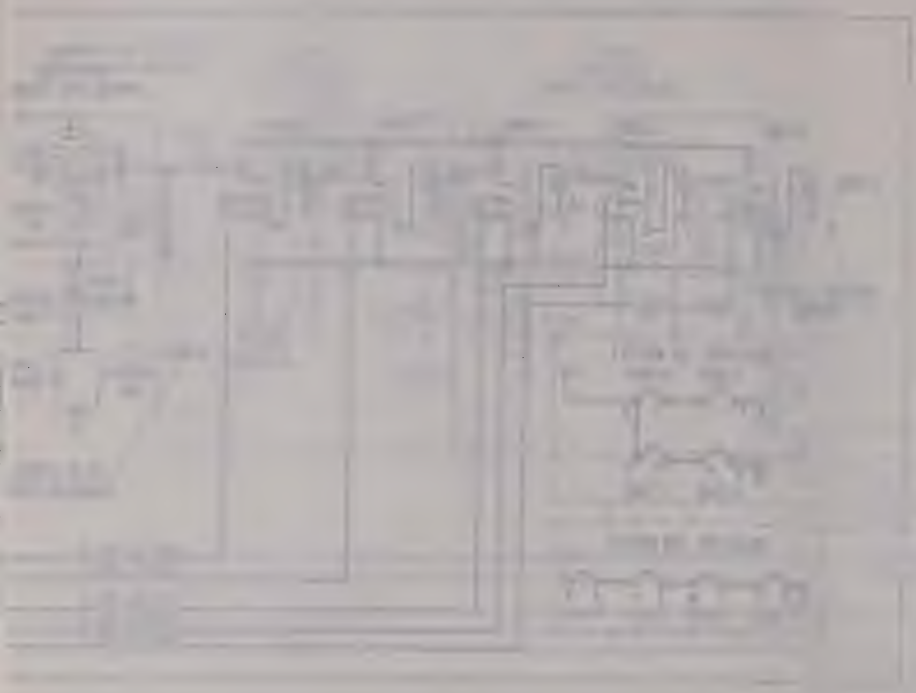


Figure 4-17. Radio Transmitter ARC Type T-11B, Schematic Diagram

5111507 O - 59



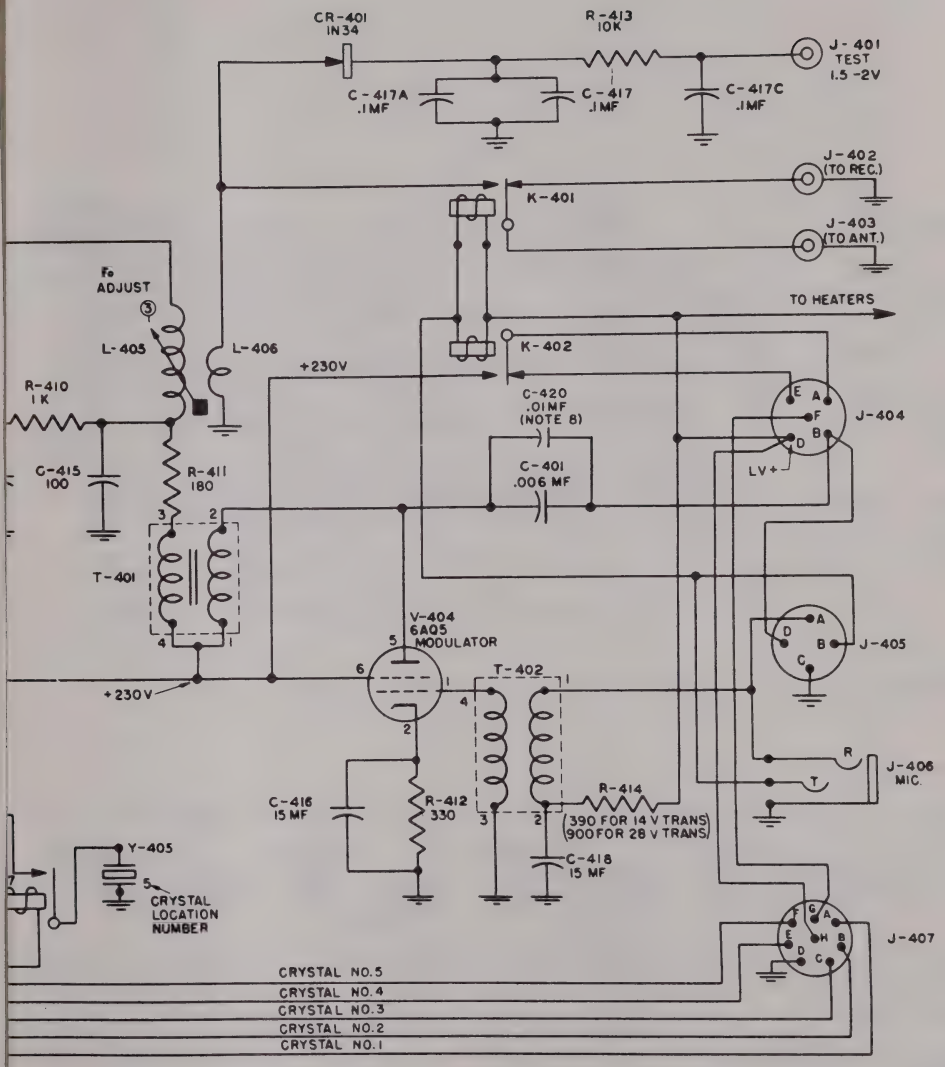
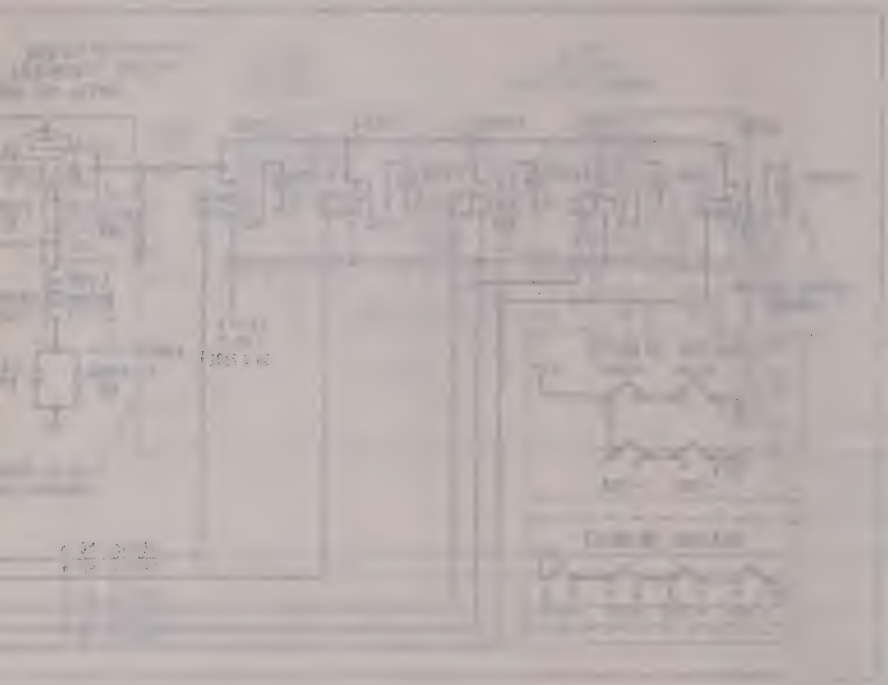


Figure 4-18. Radio Transmitter ARC Type T-13, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. ALL RELAYS ARE SHOWN UNENERGIZED. FOR KEYED RELAYS K-401 AND K-402 THIS IS THE STANDBY POSITION.
6. D-C VOLTAGES SHOWN ARE FOR THE TRANSMIT POSITION AND ARE OBTAINED WITH A 20,000 OHMS-PER-VOLT VOLTMETER AND WITH LV+ SET AT THE NOMINAL SUPPLY VOLTAGE OF 14 VOLTS OR 28 VOLTS. ALL VOLTAGES ARE APPROXIMATE AND WILL BE A LITTLE HIGHER FOR THE 28-VOLT EQUIPMENT THAN FOR THE 14-VOLT EQUIPMENT.
7. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 81 OF T-13 (14V) AND SERIAL NO. 1001 OF T-13 (28V).
8. ADDED BEGINNING WITH SERIAL NO. 81 OF T-13 (14V) AND SERIAL NO. 1001 OF T-13 (28V).
9. fo = OUTPUT FREQUENCY.

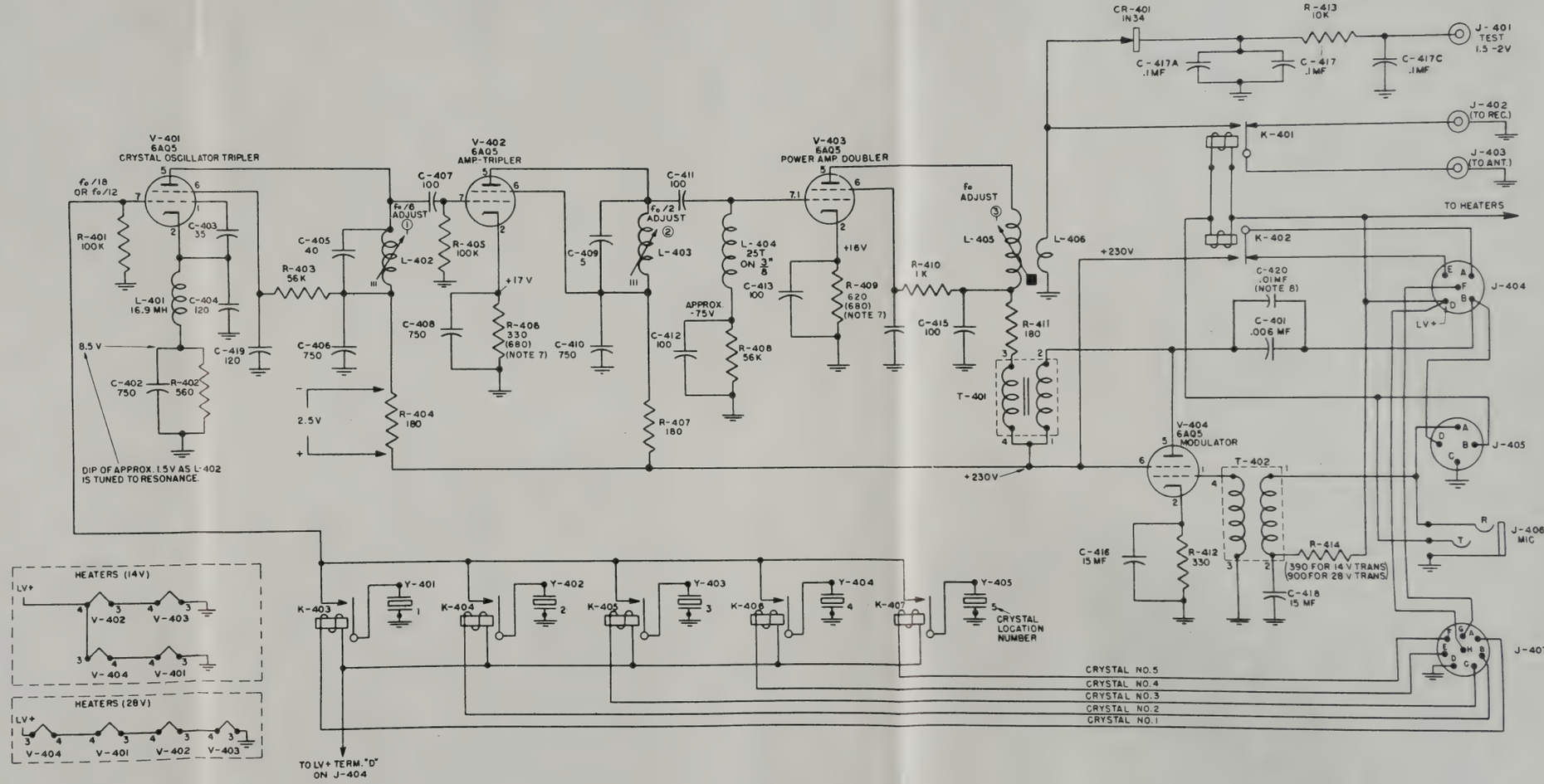
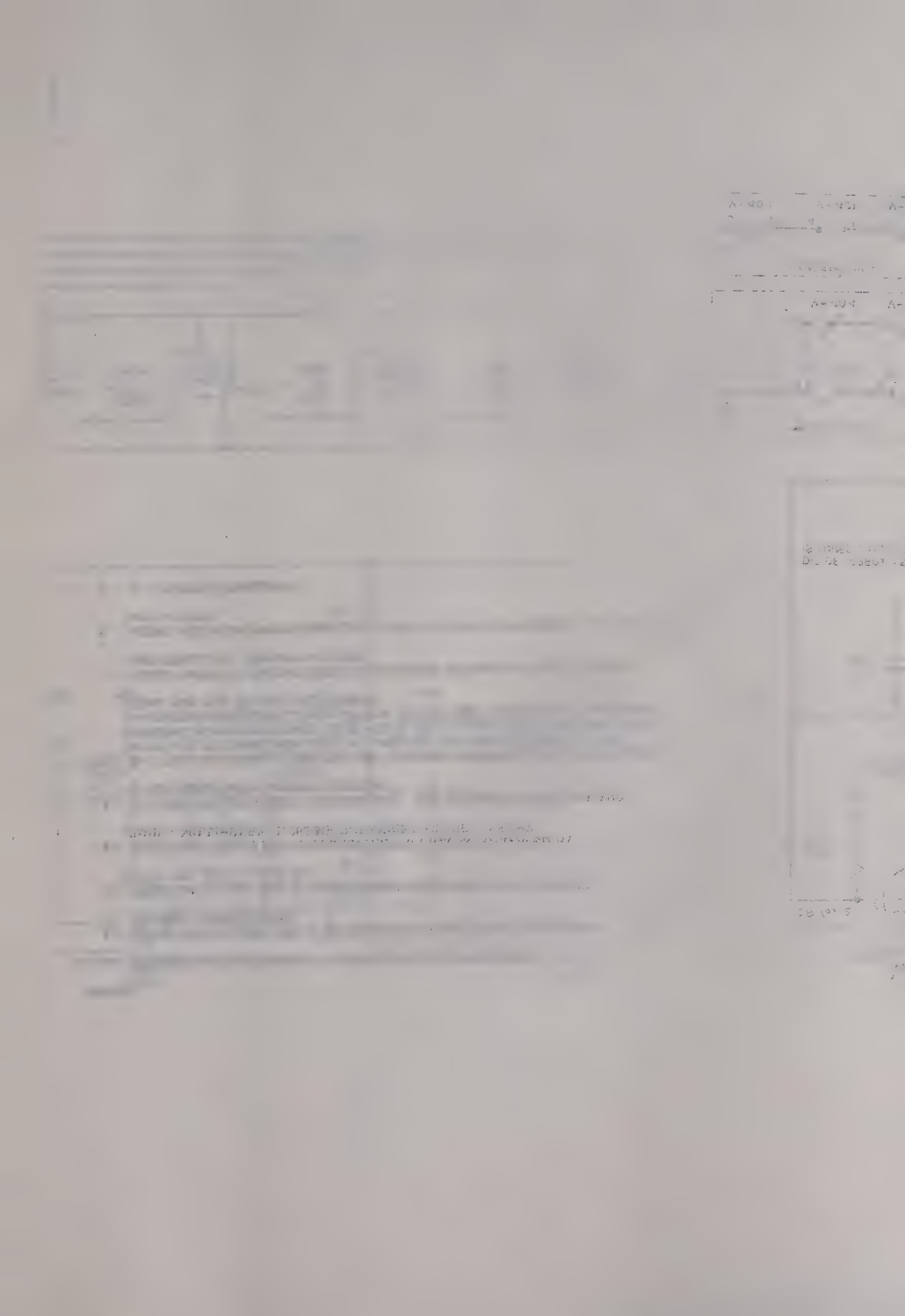
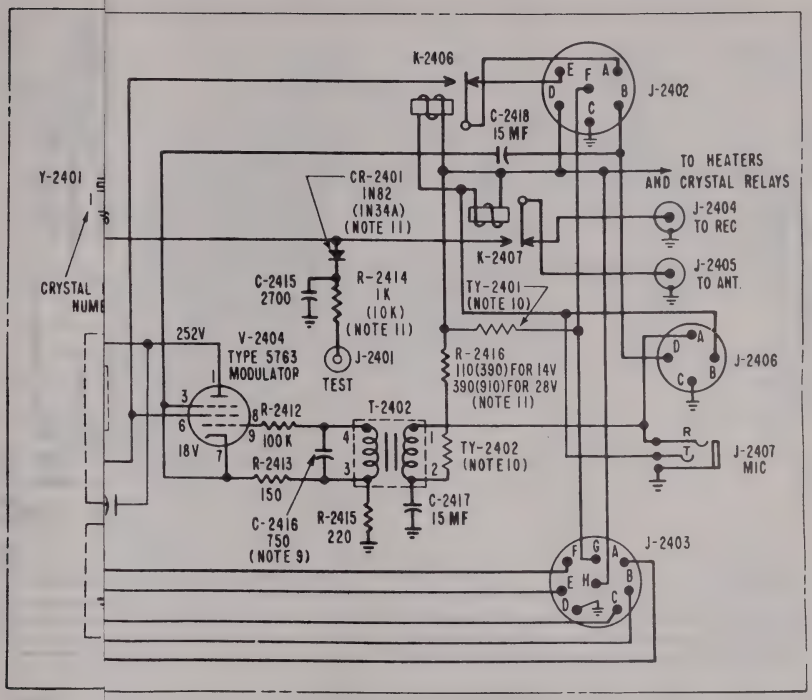


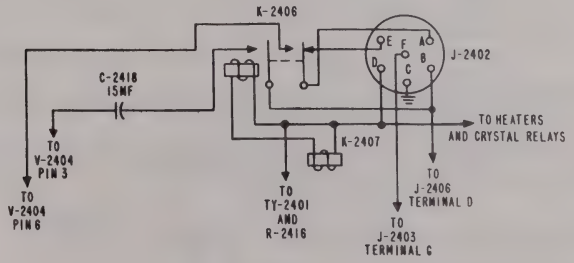
Figure 4-18. Radio Transmitter ARC Type T-13, Schematic Diagram

511507 O-59



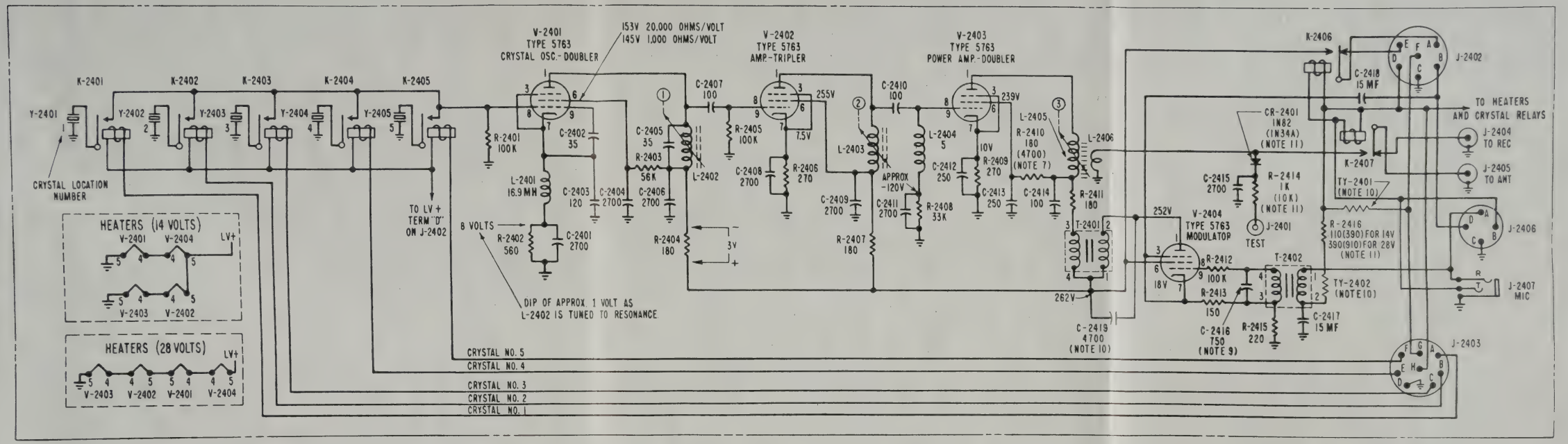


13. WIRING CONNECTION BEGINNING WITH SERIAL NO. 214 OF T-13A (14V) AND SERIAL NO. 5902 OF T-13A (28V).



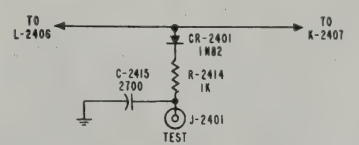
511507 O - 59

RC Type T-13A, Schematic Diagram

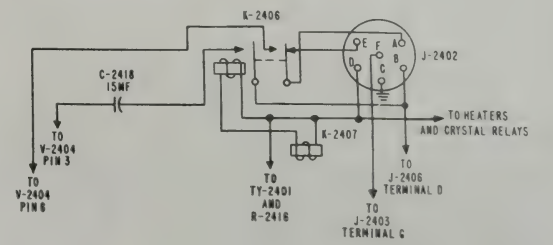


NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
3. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
4. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
5. ALL RELAYS ARE SHOWN UNENERGIZED. FOR KEYED RELAYS K-2406 AND K-2407 THIS IS THE STANDBY POSITION.
6. D-C VOLTAGE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS EXCEPT WHERE A DIFFERENT CONNECTION IS INDICATED.
   B. LV+ AT INPUT TERMINAL OF TYPE D-10A DYNAMOTOR ON RECEIVER SET AT 13.5 VOLTS FOR T-13A (14V) OR 27 VOLTS FOR T-13A (28V).
   C. VOLTMETER OHMS-PER-VOLT: EITHER 1,000 OR 20,000 EXCEPT WHERE SPECIFICALLY INDICATED.
7. VALUES SHOWN IN PARENTHESIS USED BEGINNING WITH SERIAL NO. 1001 OF T-13A (14V) AND SERIAL NO. 701 OF T-13A (28V).
8. ADDED BEGINNING WITH SERIAL NO. 1001 OF T-13A (14V) AND SERIAL NO. 701 OF T-13A (28V).
9. DELETED BEGINNING WITH SERIAL NO. 214 OF T-13A (14V) AND SERIAL NO. 5902 OF T-13A (28V).
10. ADDED BEGINNING WITH SERIAL NO. 214 OF T-13A (14V) AND SERIAL NO. 5902 OF T-13A (28V).
11. VALUE SHOWN IN PARENTHESIS USED BEFORE SERIAL NO. 214 OF T-13A (14V) AND SERIAL NO. 5902 OF T-13A (28V).
12. WIRING CONNECTION BEGINNING WITH SERIAL NO. 214 OF T-13A (14V) AND SERIAL NO. 5902 OF T-13A (28V) SHOWN BELOW:

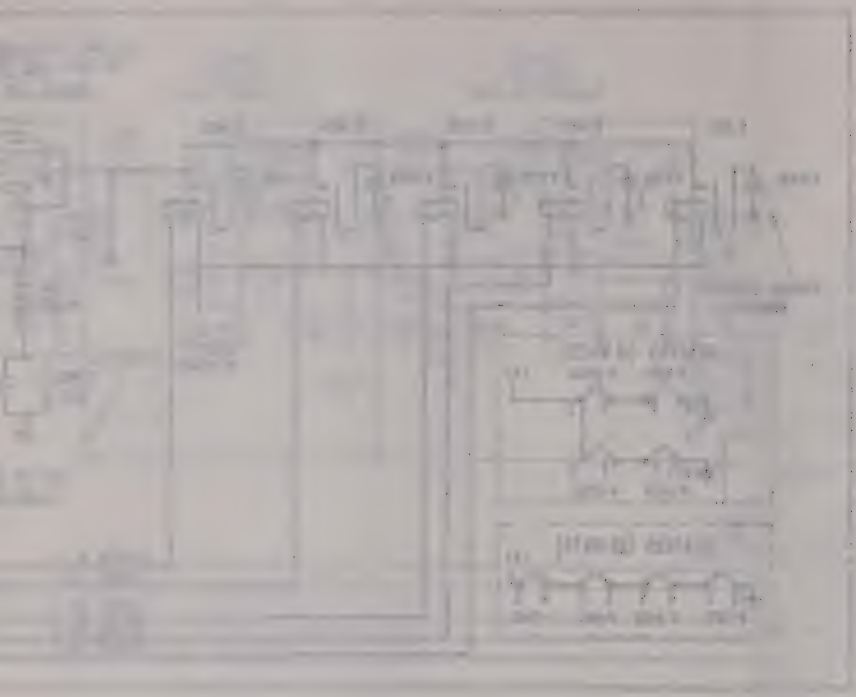


13. WIRING CONNECTION BEGINNING WITH SERIAL NO. 214 OF T-13A (14V) AND SERIAL NO. 5902 OF T-13A (28V).



511507 O - 59

Figure 4-19. Radio Transmitter ARC Type T-13A, Schematic Diagram



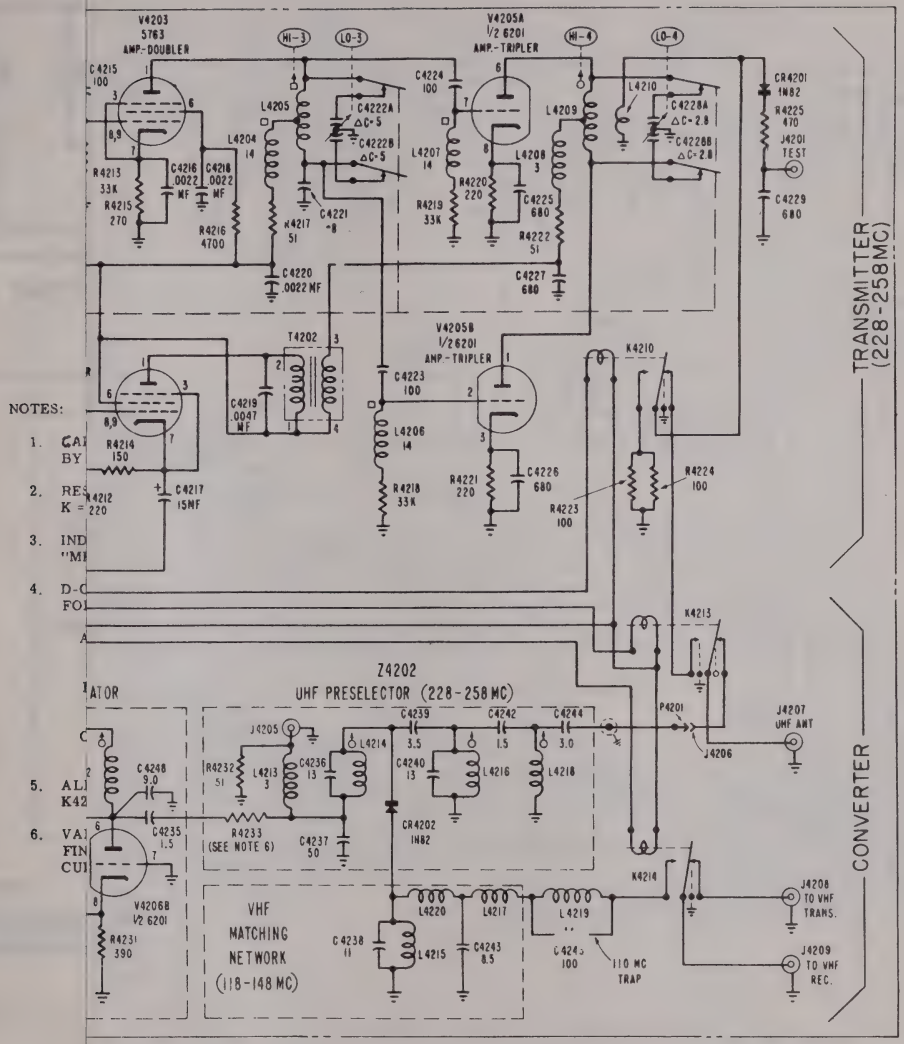
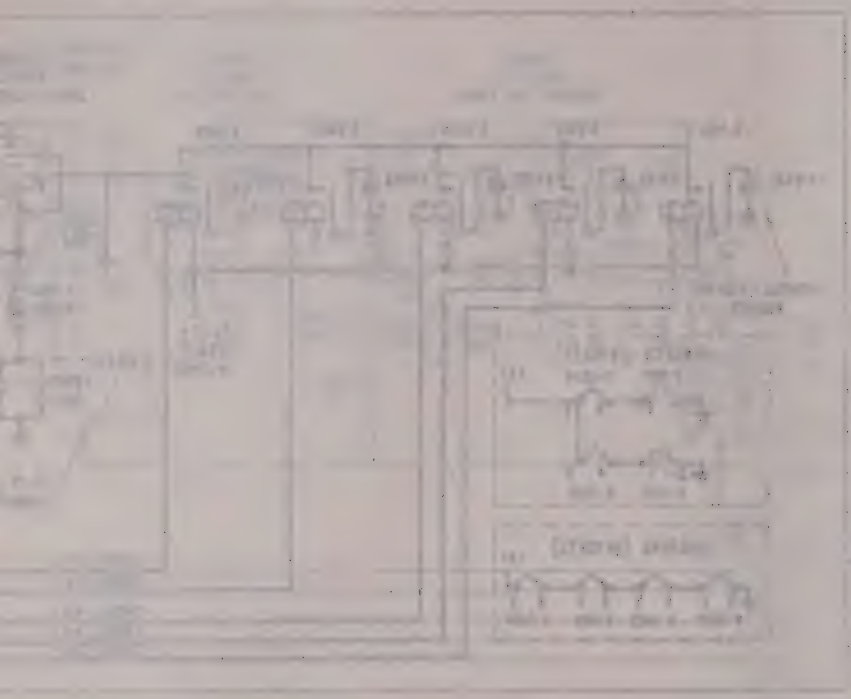


Figure 4-20. UHF Transverter ARC Type TV-10, Schematic Diagram

5111507 O - 59



NOTES:

1. CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS FOLLOWED BY "MF" - MICROFARAD.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. INDUCTOR VALUES ARE IN MICROHENRIES UNLESS FOLLOWED BY "MH" - MILLIHENRY (1,000 MICROHENRIES) OR "H" - HENRY.
4. D-C VOLTAGE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   A. NEGATIVE TERMINAL OF VOLTMETER GROUNDED TO CHASSIS, EXCEPT WHERE A DIFFERENT CONDITION IS INDICATED.
   B. LV+ AT TERMINAL "A" OF J4203 SET AT 27.5 VOLTS BY ADJUSTMENT OF LV+ SOURCE.
   C. VOLTMETER OHMS-PER-VOLT: EITHER 1,000 OR 20,000 EXCEPT WHERE SPECIFICALLY INDICATED.
5. ALL RELAYS ARE SHOWN UNENERGIZED. FOR KEYED RELAYS K4211 AND K4212 THIS IS THE STANDBY POSITION.
6. VALUE NORMALLY 68 OHMS. MAY BE CHANGED TO 47 OR 82 OHMS AT FINAL ADJUSTMENT IF NECESSARY TO OBTAIN SPECIFIED MIXER CRYSTAL CURRENT WITH AVERAGE 6201 OSCILLATOR TUBE.

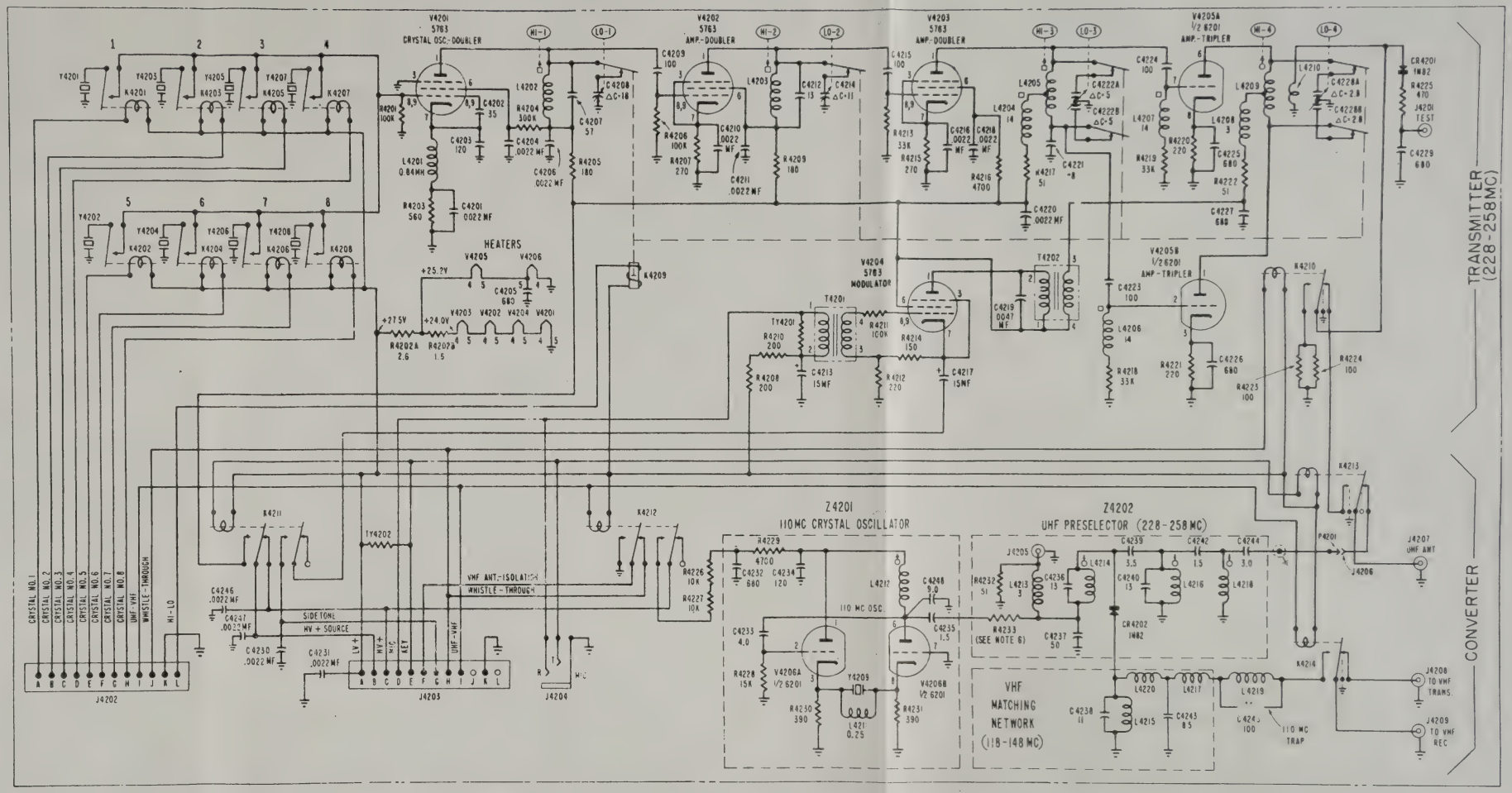


Figure 4-20. UHF Transverter ARC Type TV-10, Schematic Diagram

511507 O - 59

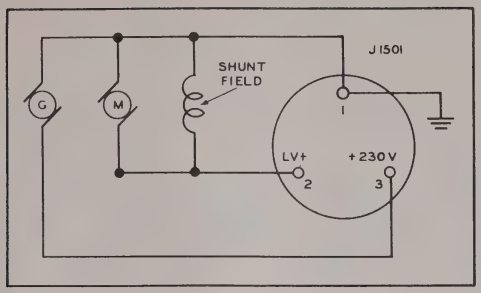


Figure 4-21. Dynamotor ARC Type D-10, Schematic Diagram

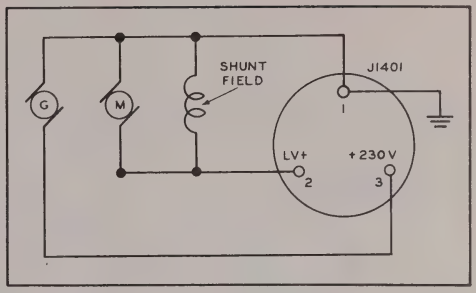


Figure 4-22. Dynamotor ARC Type D-10A, Schematic Diagram

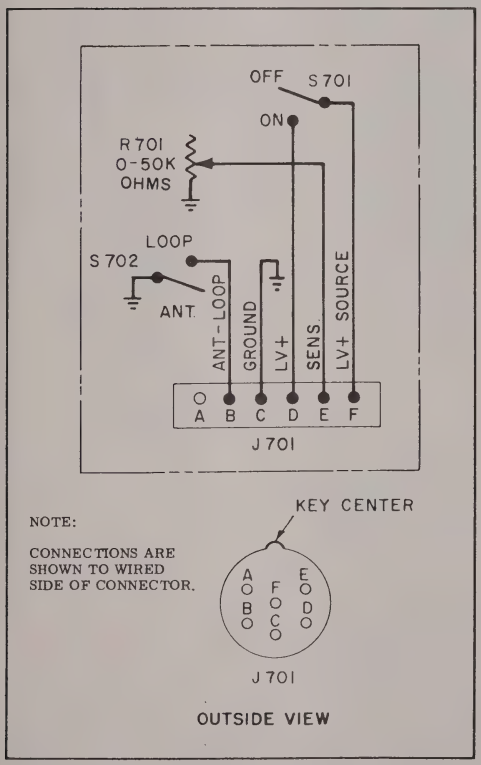


Figure 4-23. Control Unit ARC Type C-16, Schematic Diagram

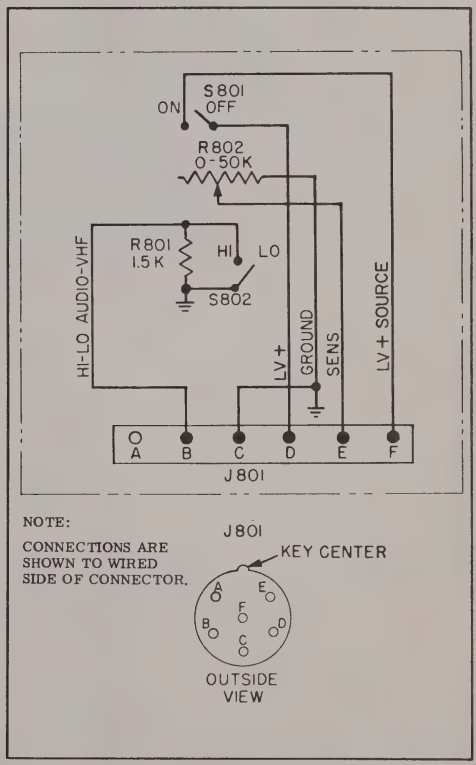
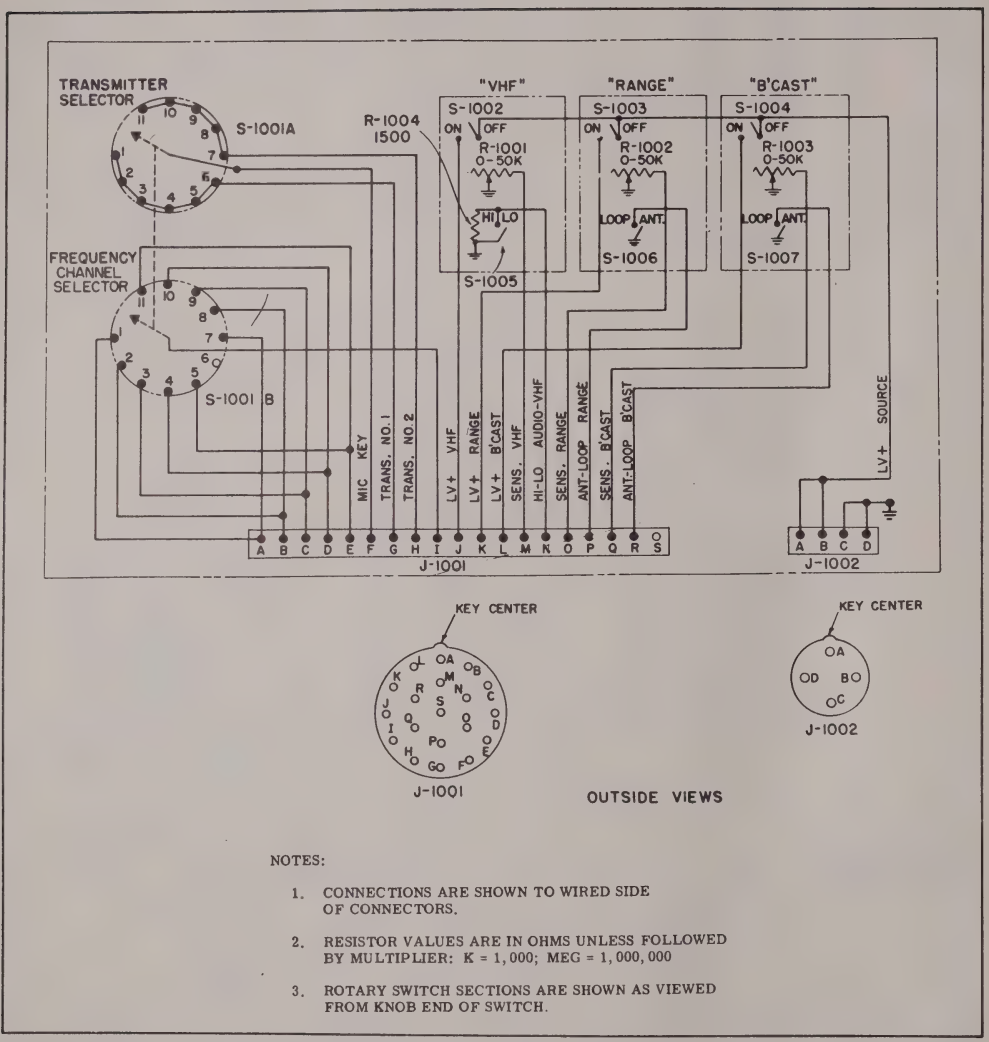


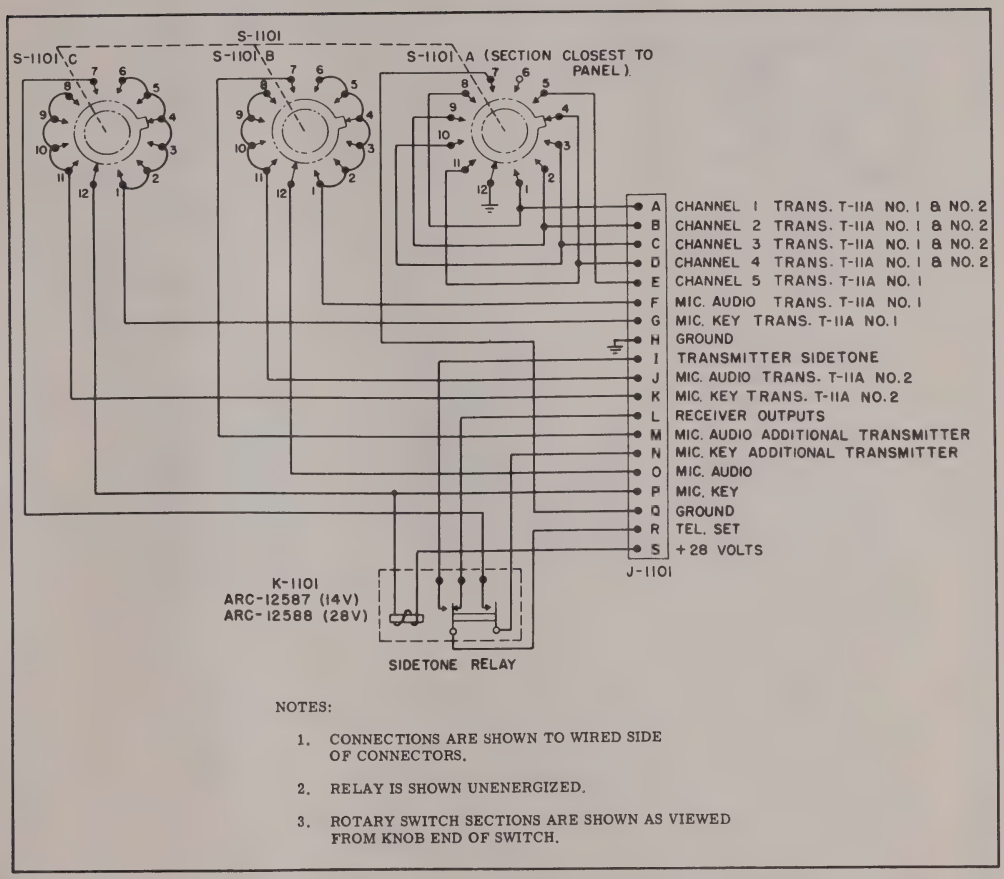
Figure 4-24. Control Unit ARC Type C-17, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000
3. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

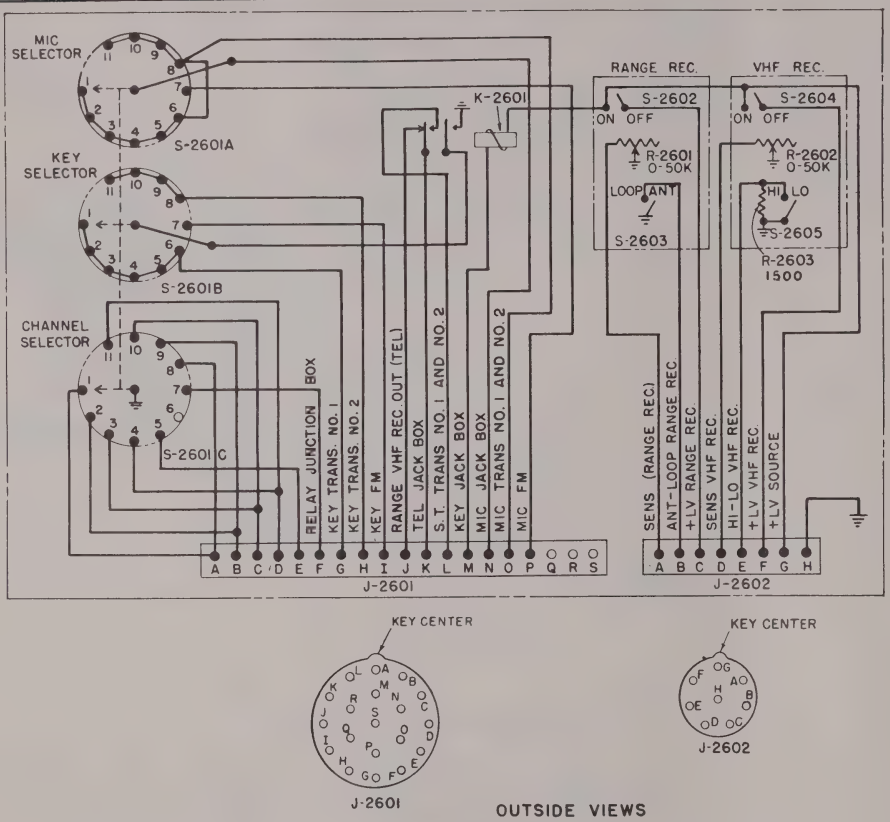
Figure 4-25. Control Unit ARC Type C-24, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RELAY IS SHOWN UNENERGIZED.
3. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

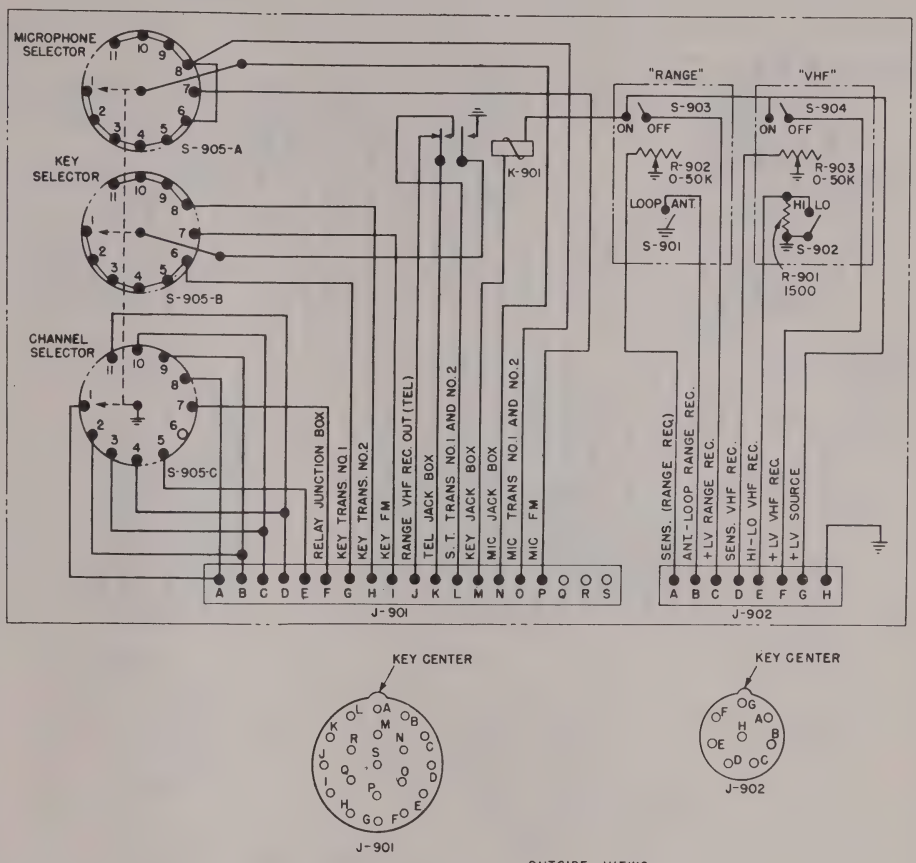
Figure 4-26. Control Unit ARC Type C-25, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. RELAY IS SHOWN UNENERGIZED.
4. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

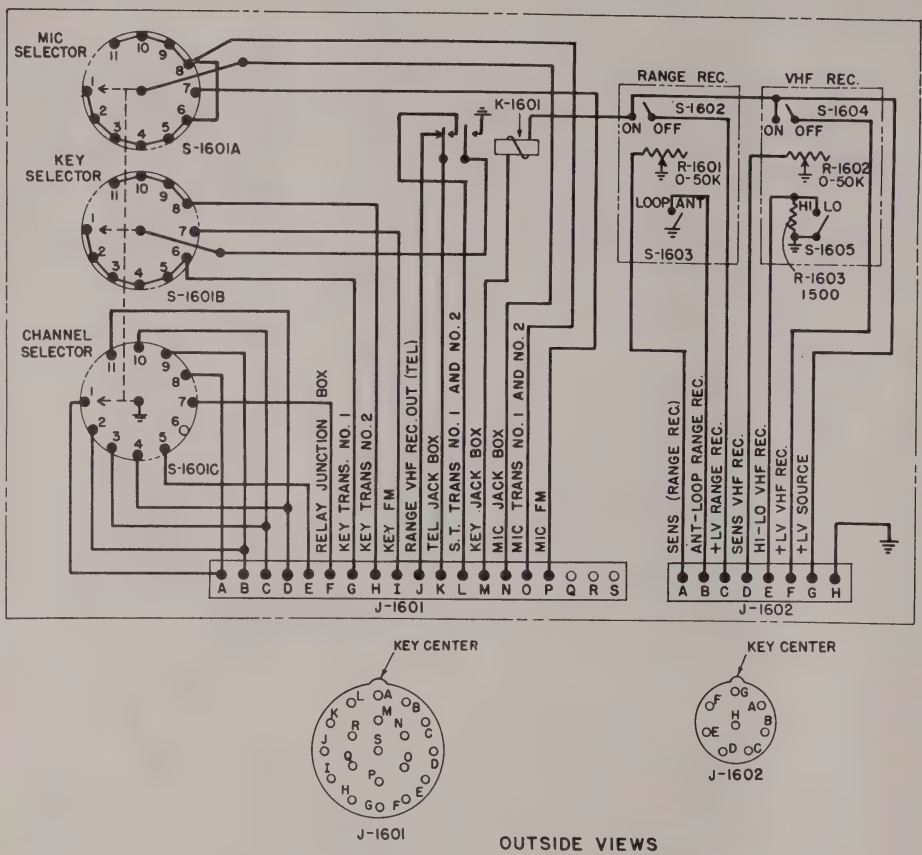
Figure 4-27. Control Unit ARC Type C-36, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. RELAY IS SHOWN UNENERGIZED.
4. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

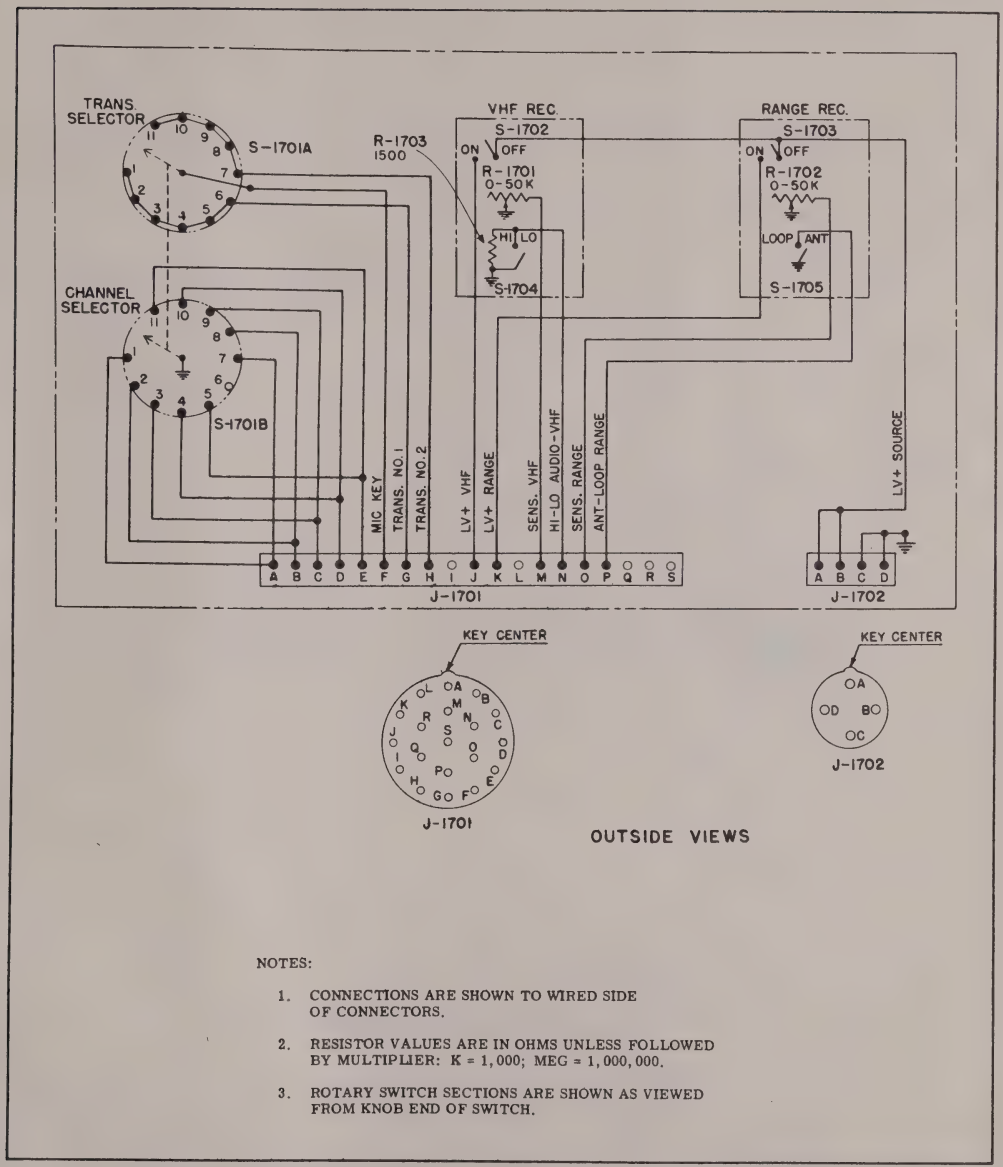
Figure 4-28. Control Unit ARC Type C-37, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. RELAY IS SHOWN UNENERGIZED.
4. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

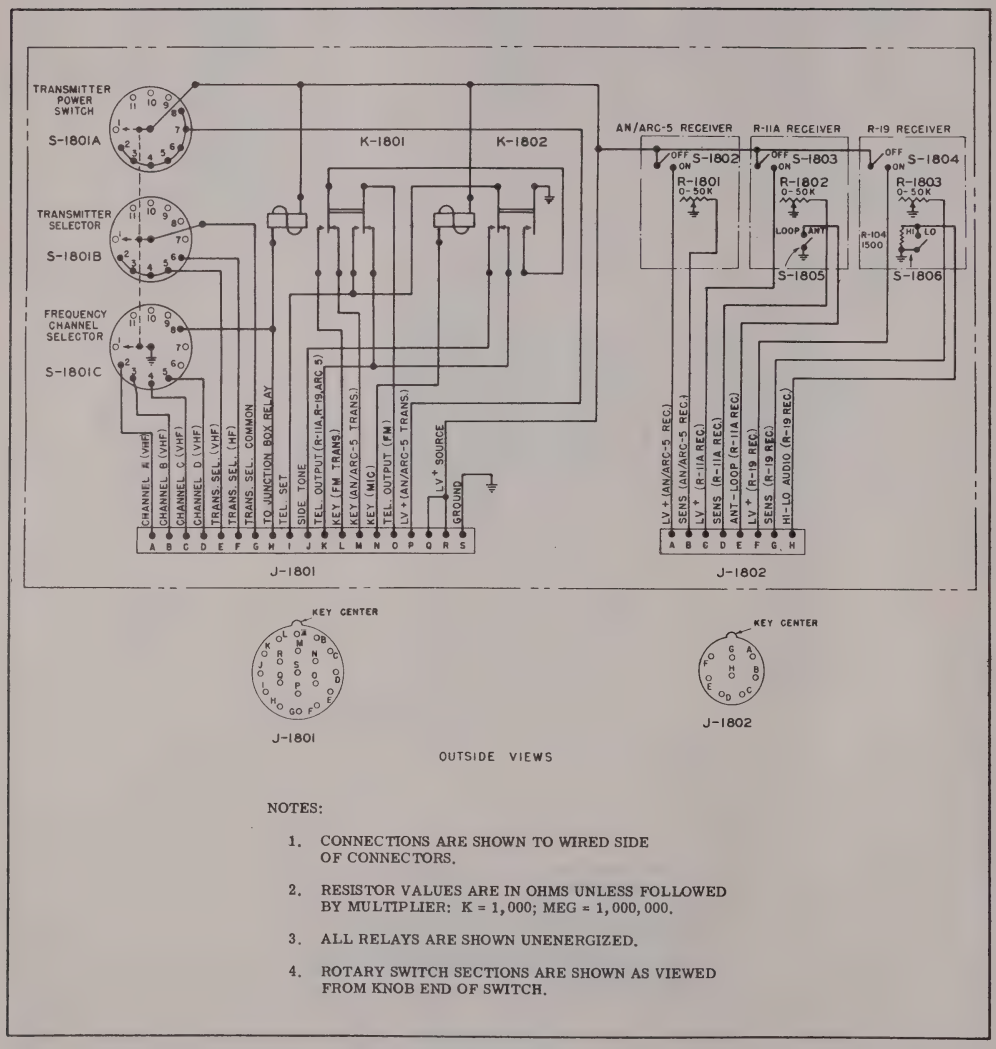
Figure 4-29. Control Unit ARC Type C-38, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

Figure 4-30. Control Unit ARC Type C-39, Schematic Diagram

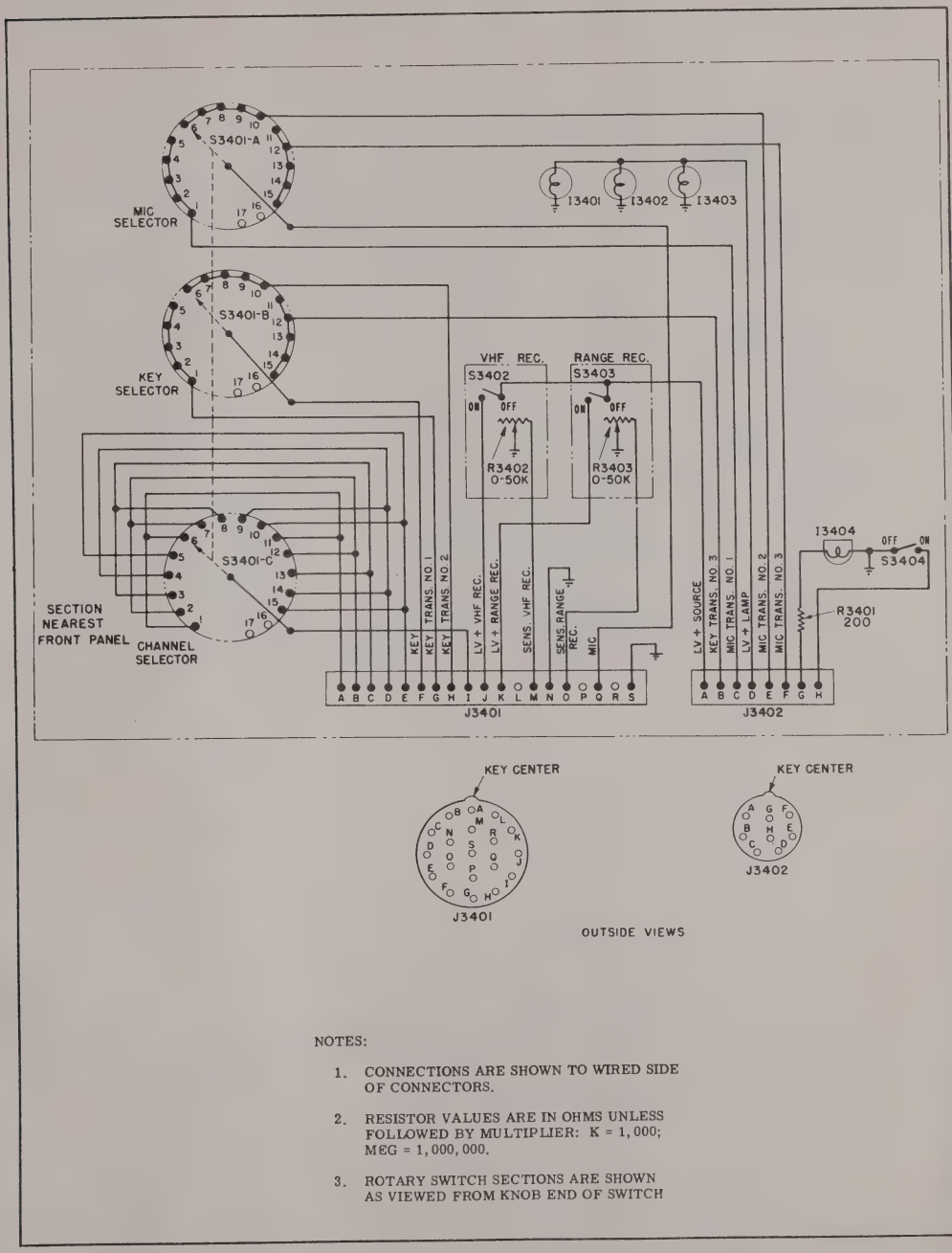


OUTSIDE VIEWS

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. ALL RELAYS ARE SHOWN UNENERGIZED.
4. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

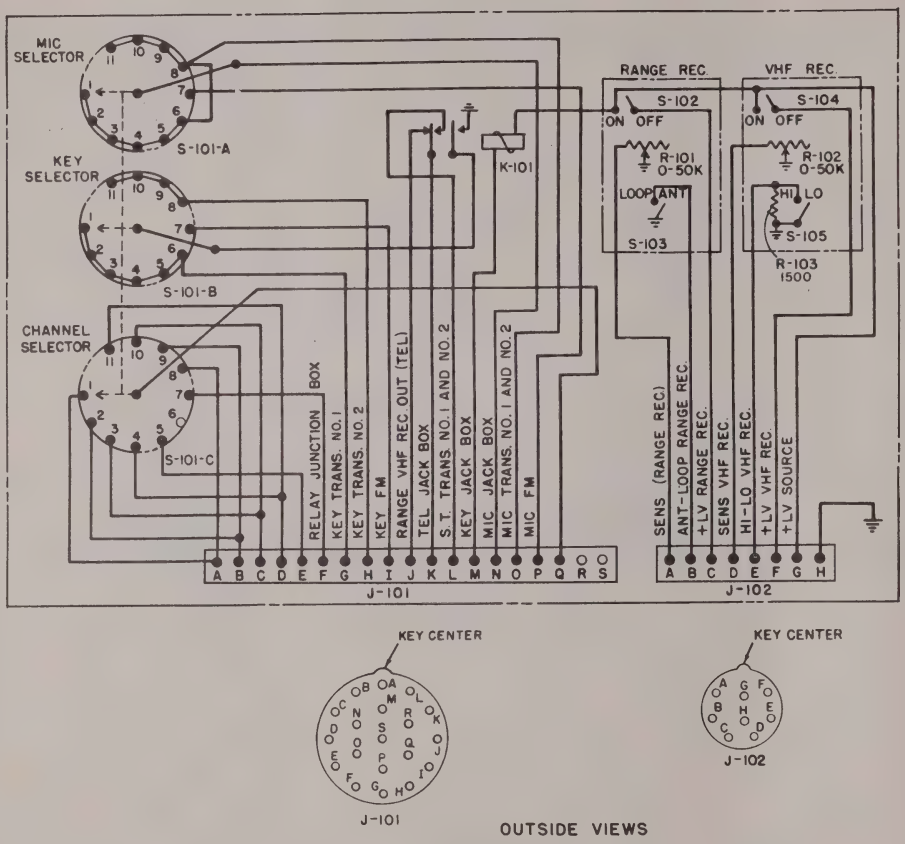
Figure 4-31. Control Unit ARC Type C-40, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH

Figure 4-32. Control Unit ARC Type C-44, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. RELAY IS SHOWN UNENERGIZED.
4. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

Figure 4-33. Control Unit ARC Type C-46, Schematic Diagram

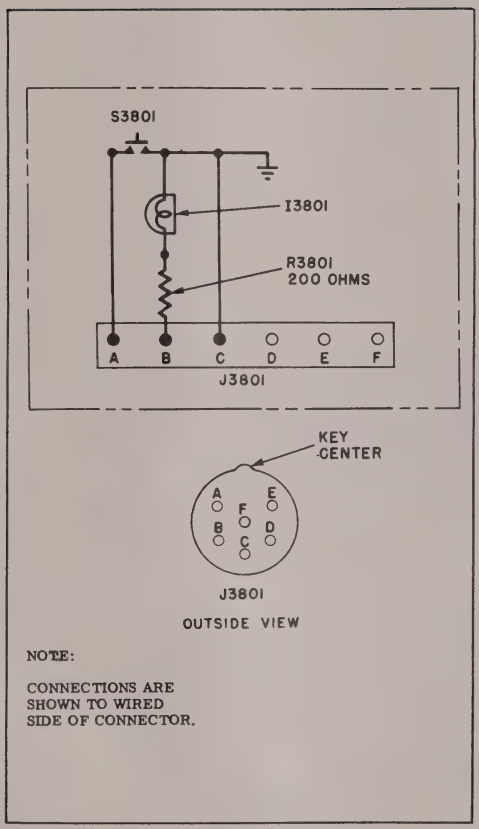


Figure 4-34. Control Unit ARC Type C-47, Schematic Diagram

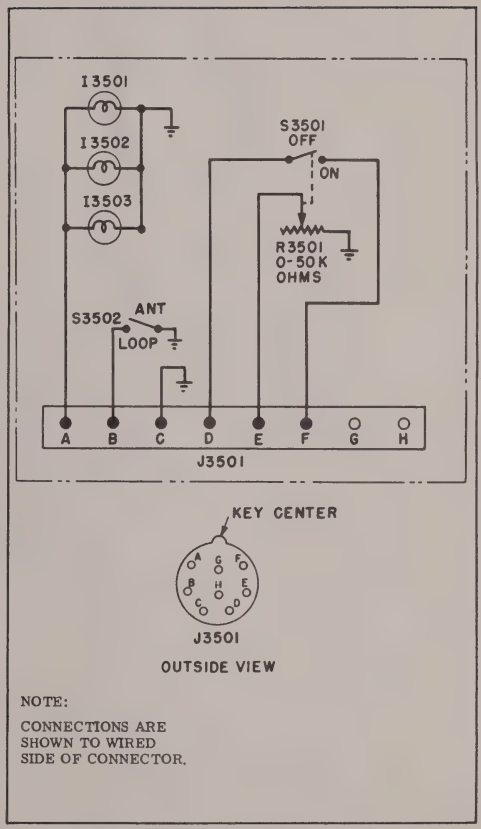
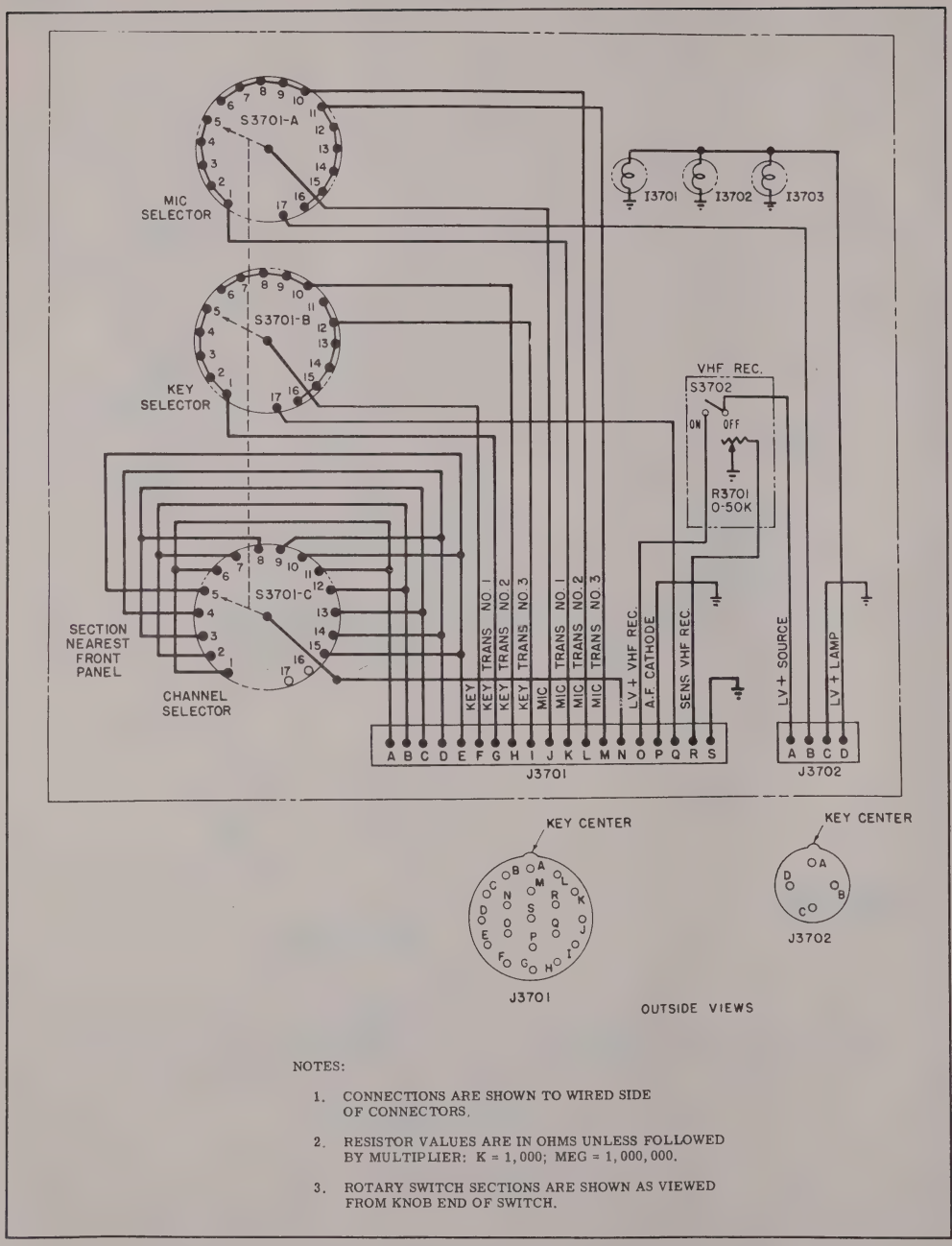


Figure 4-35. Control Unit ARC Type C-48, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

Figure 4-36. Control Unit ARC Type C-49, Schematic Diagram

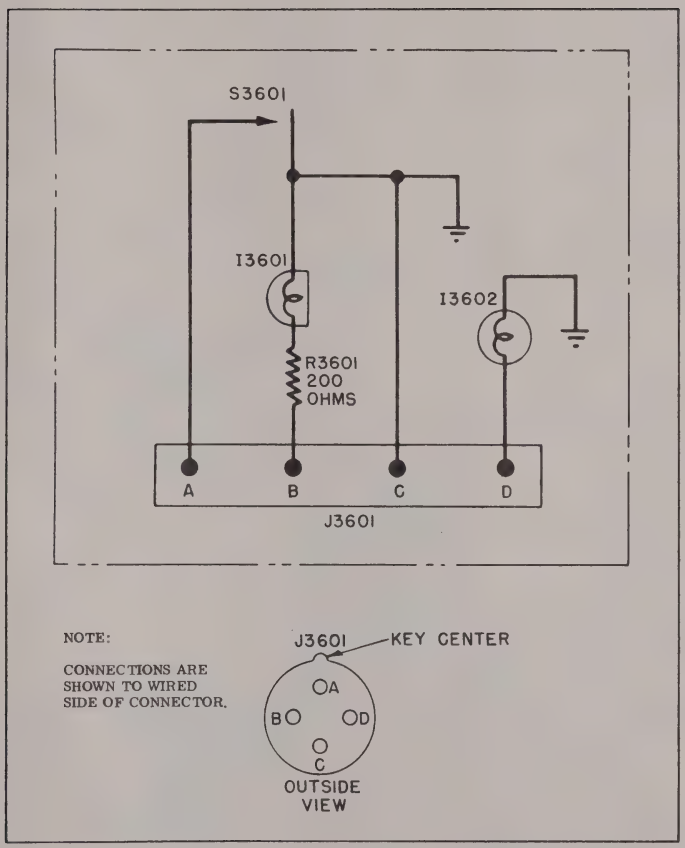
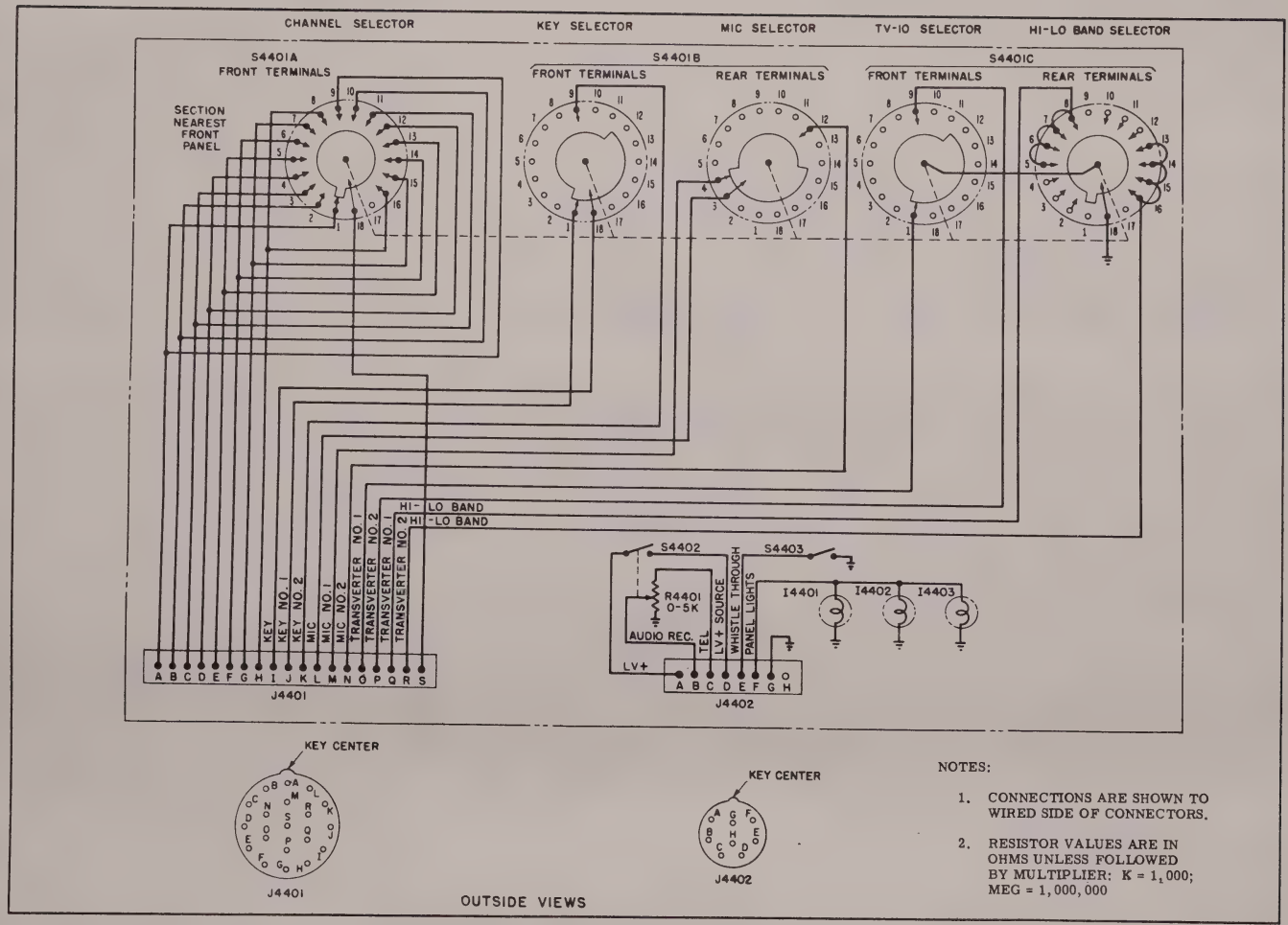


Figure 4-37. Control Unit ARC Type C-50, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000

Figure 4-38. Control Unit ARC Type C-52, Schematic Diagram

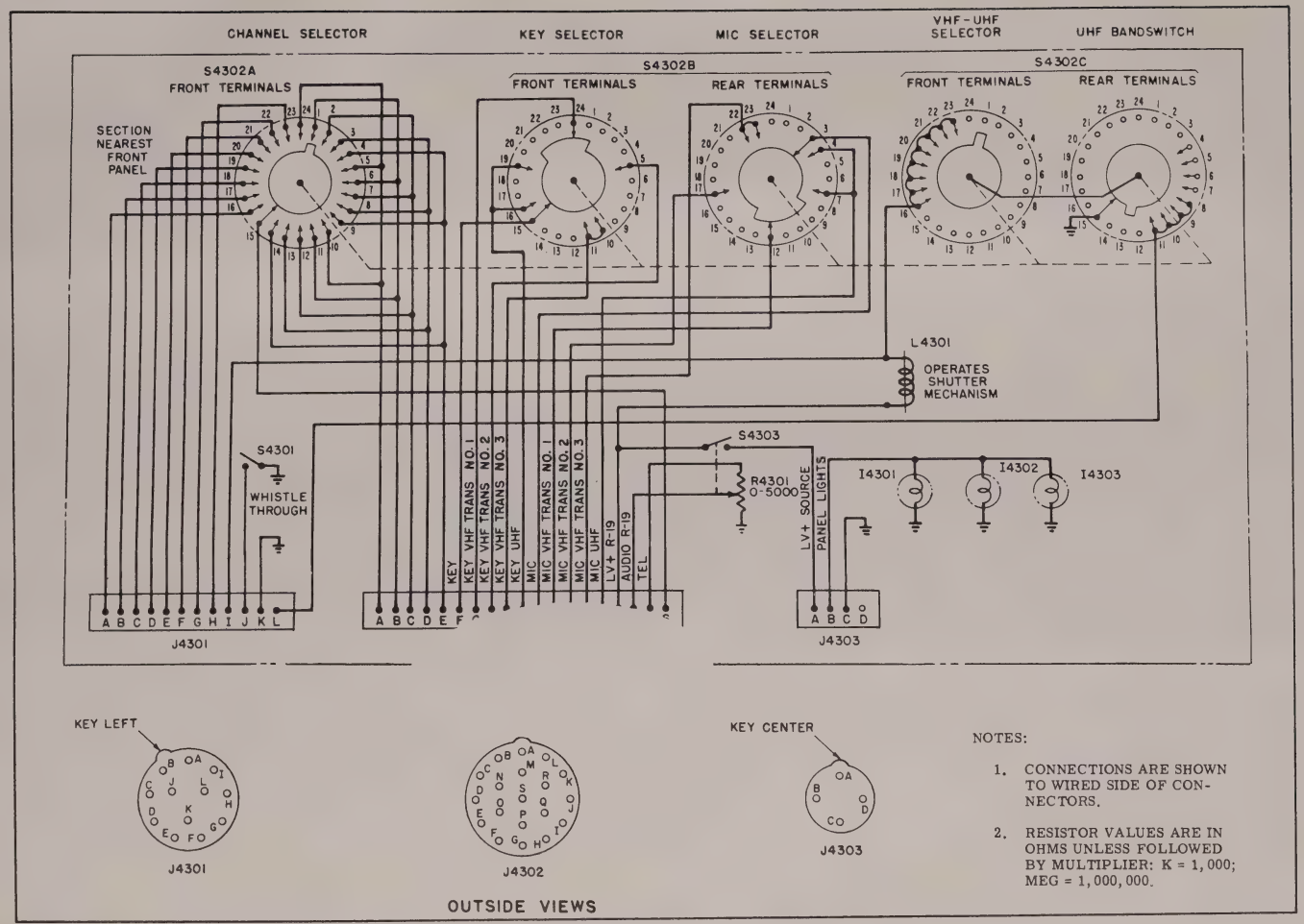


Figure 4-39. Control Unit ARC Type C-53, Schematic Diagram

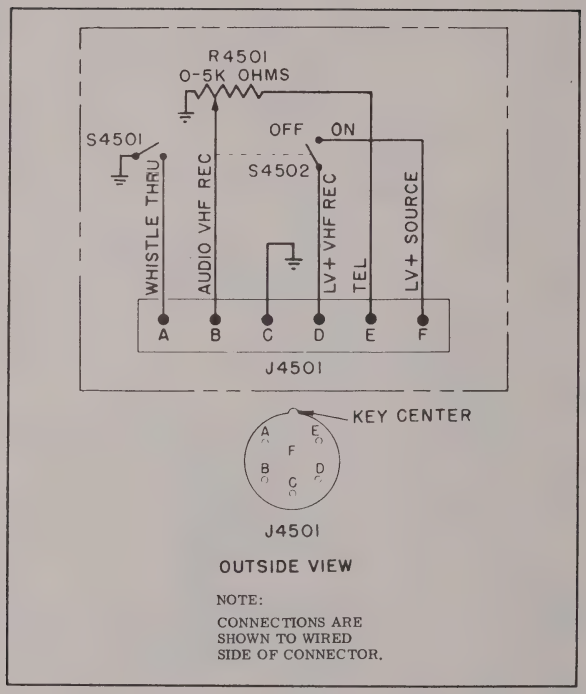
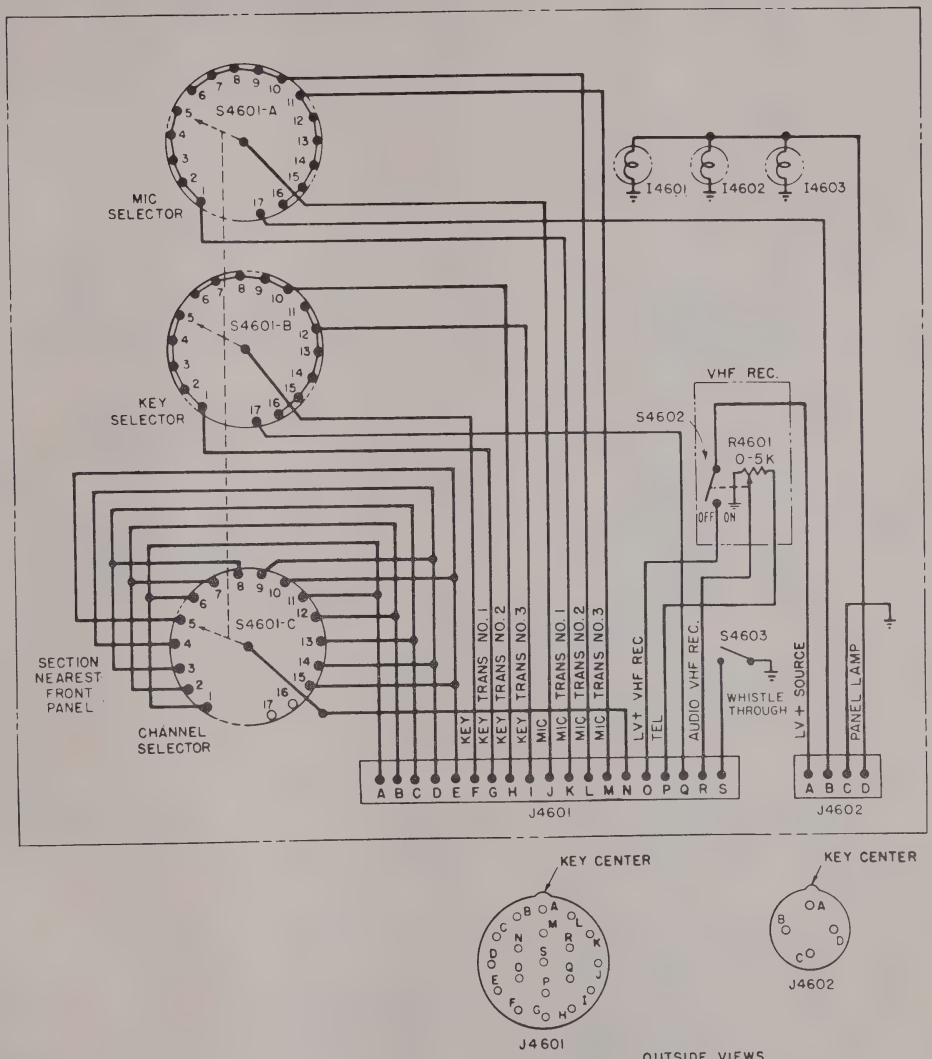


Figure 4-40. Control Units ARC Type C-54 and C-55, Schematic Diagram



NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. ROTARY SWITCH SECTIONS ARE SHOWN AS VIEWED FROM KNOB END OF SWITCH.

Figure 4-41. Control Unit ARC Type C-56, Schematic Diagram

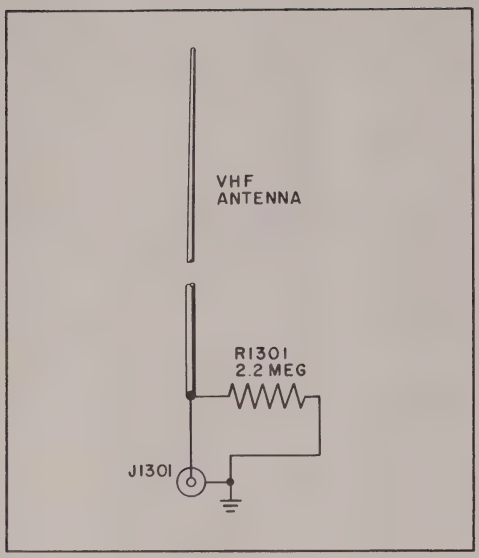


Figure 4-42. Antenna ARC Type A-12, Schematic Diagram

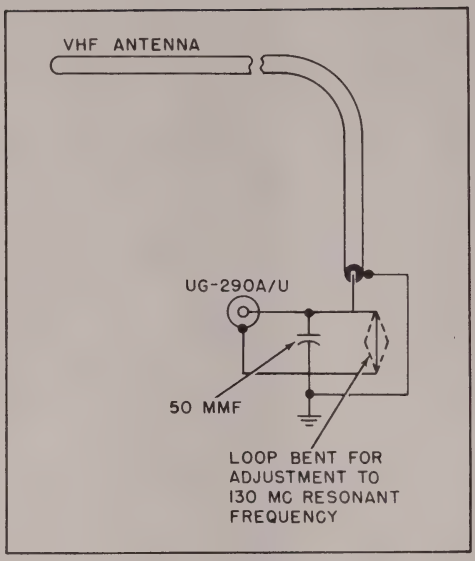


Figure 4-43. Antenna ARC Type A-15, Schematic Diagram

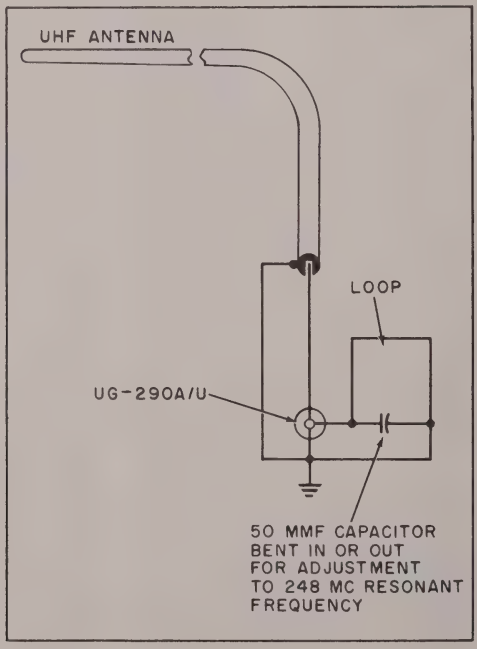
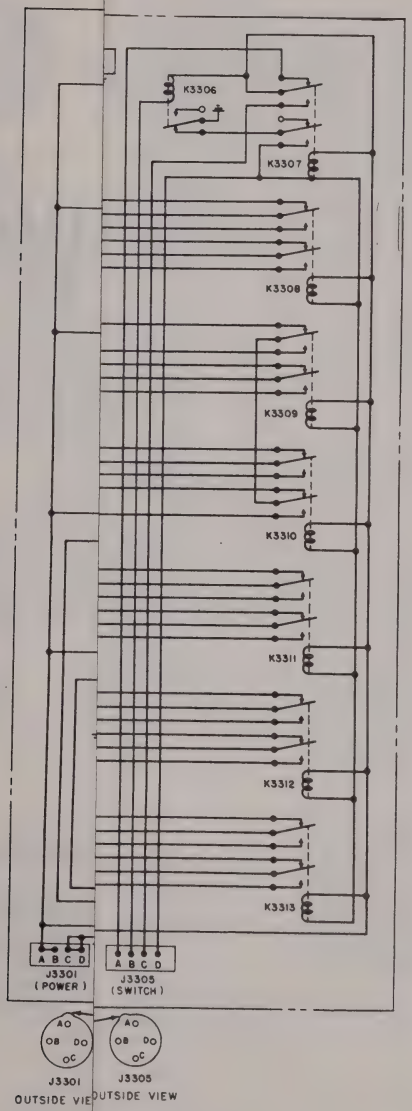


Figure 4-44. Antenna ARC Type A-16, Schematic Diagram

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. ALL RELAYS ARE SHOWN UNENERGIZED.



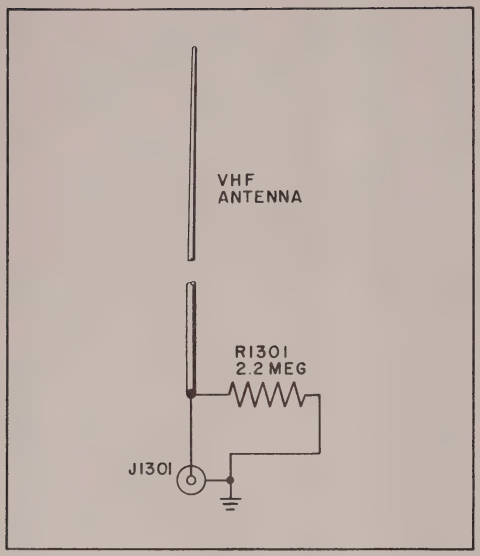


Figure 4-42. Antenna ARC Type A-12, Schematic Diagram

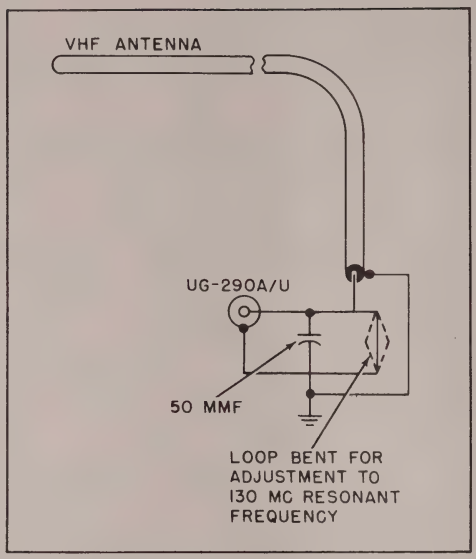


Figure 4-43. Antenna ARC Type A-15, Schematic Diagram

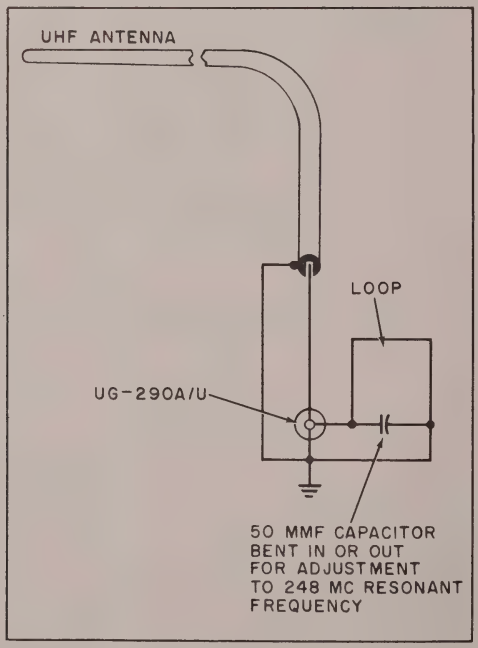


Figure 4-44. Antenna ARC Type A-16, Schematic Diagram

NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. ALL RELAYS ARE SHOWN UNENERGIZED.

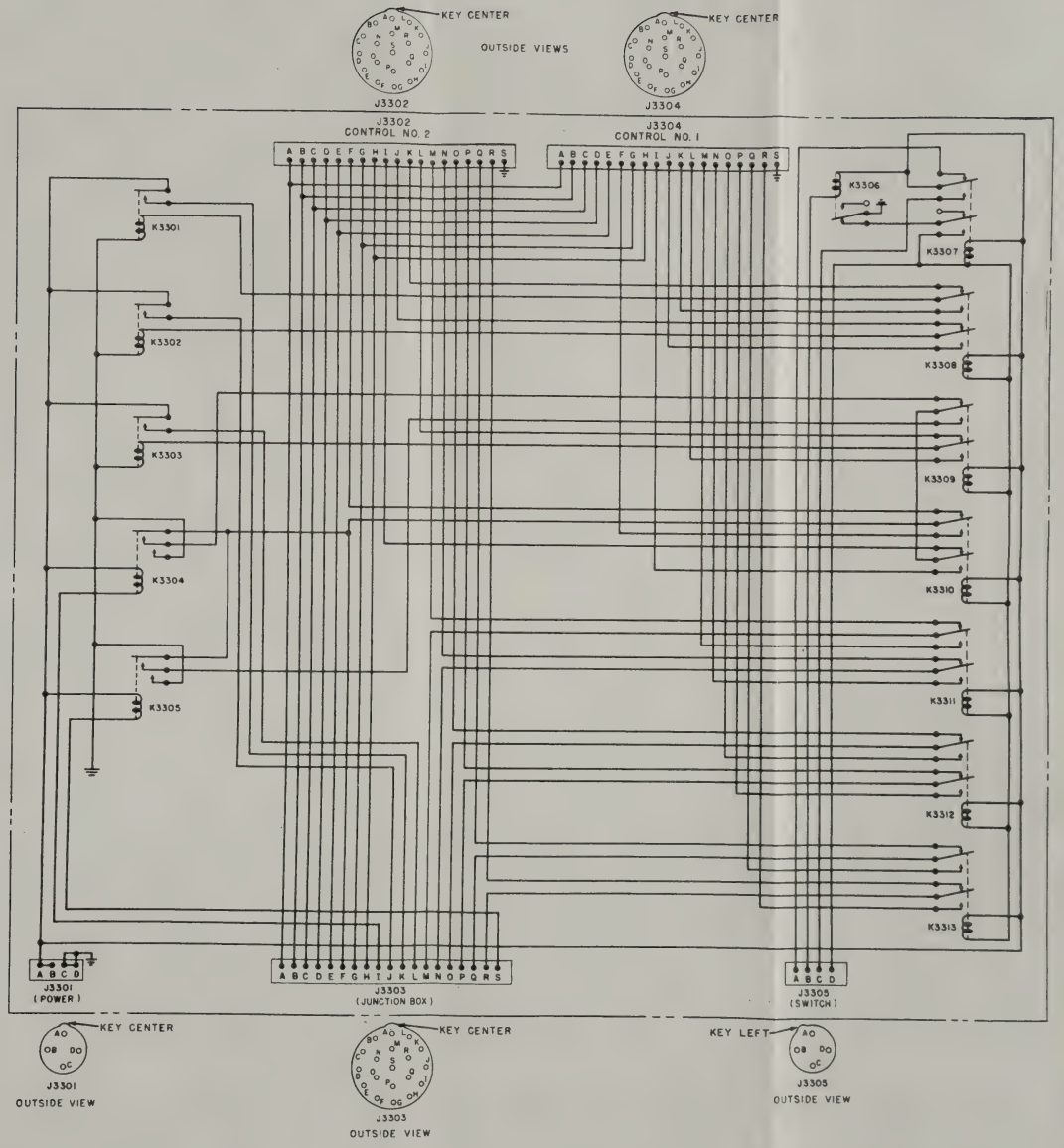
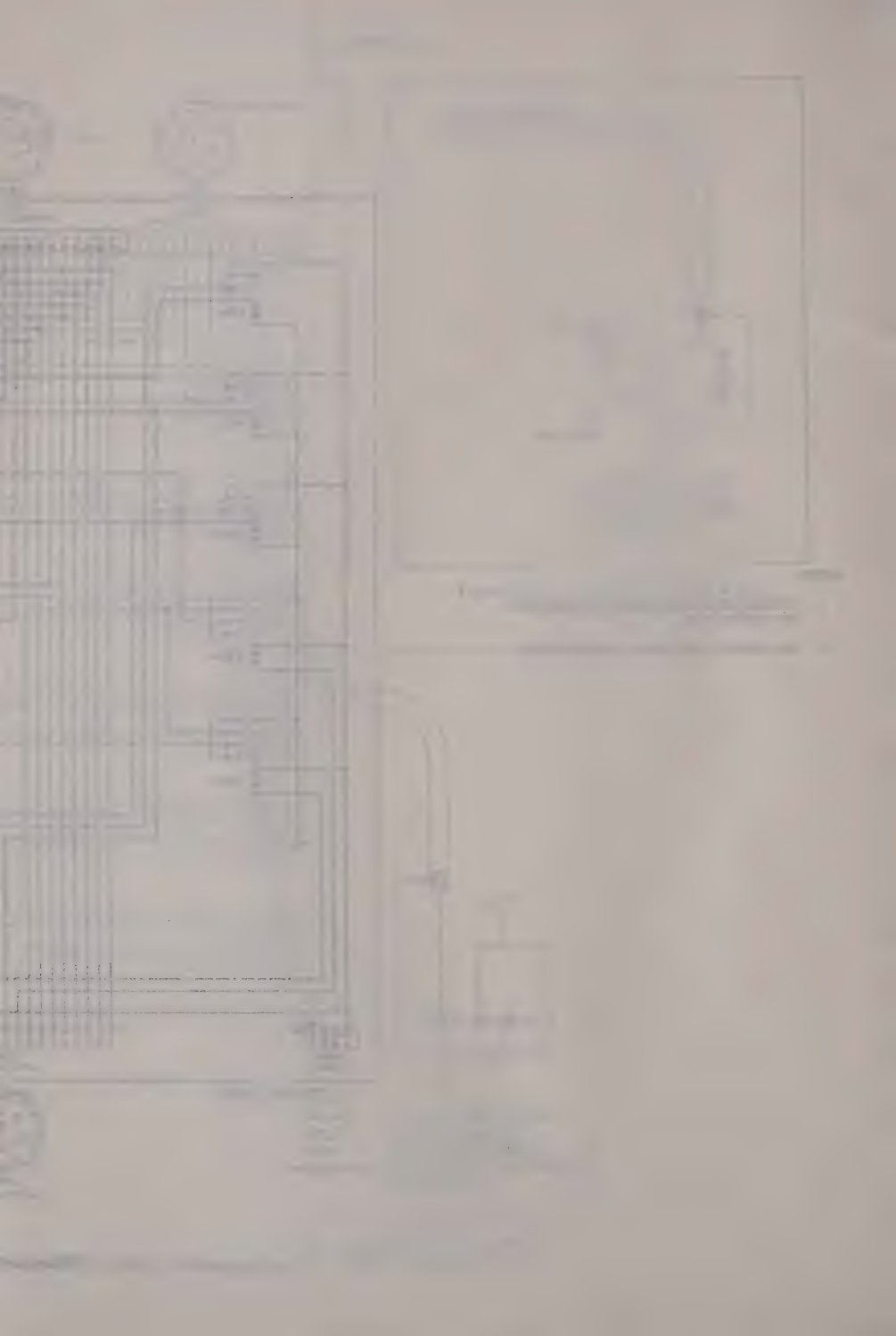
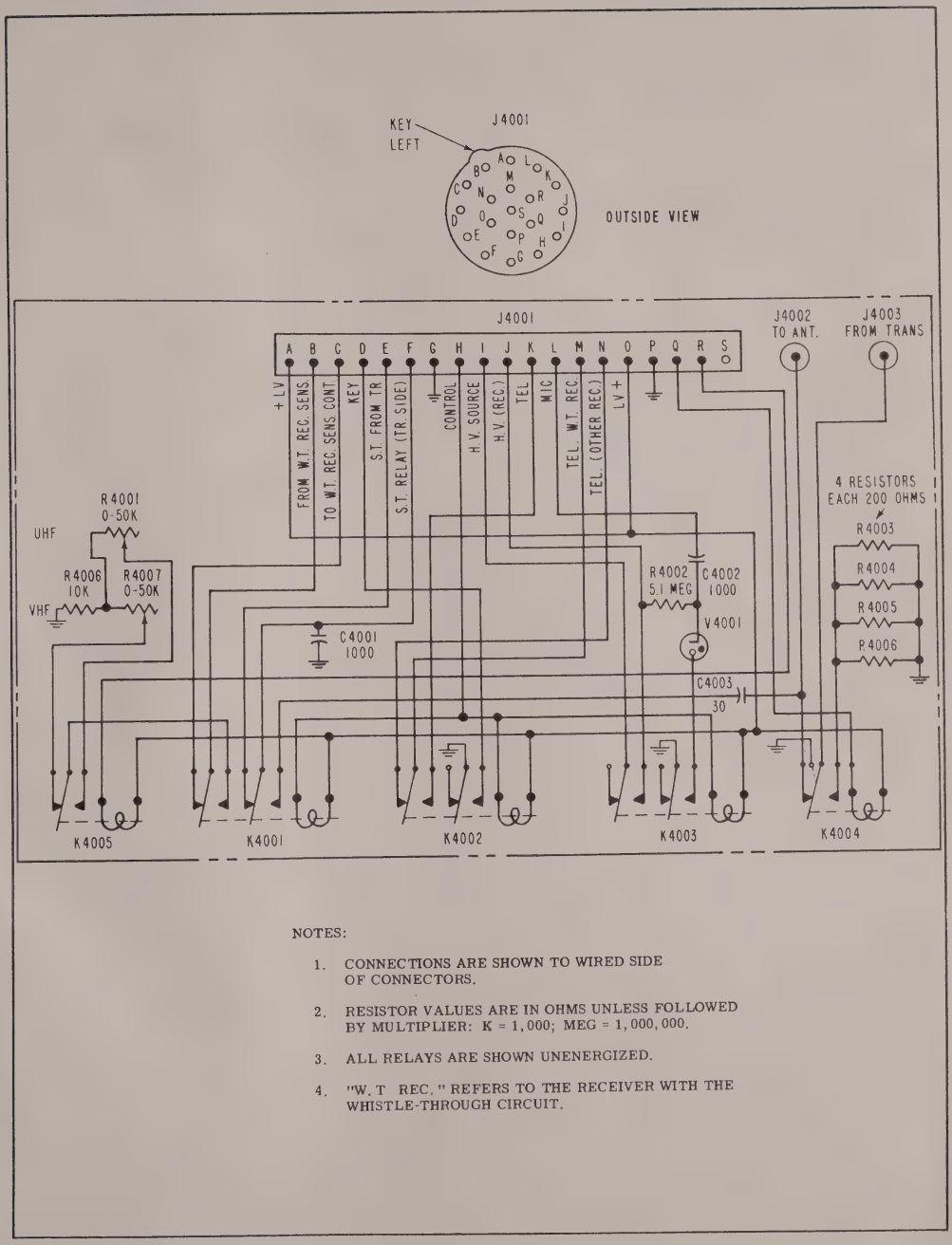


Figure 4-45. Relay Unit ARC Type K-12, Schematic Diagram





NOTES:

1. CONNECTIONS ARE SHOWN TO WIRED SIDE OF CONNECTORS.
2. RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER: K = 1,000; MEG = 1,000,000.
3. ALL RELAYS ARE SHOWN UNENERGIZED.
4. "W.T REC." REFERS TO THE RECEIVER WITH THE WHISTLE-THROUGH CIRCUIT.

Figure 4-46. Oscillator-Relay Unit ARC Type K-13, Schematic Diagram

AG 413.44 (4 Mar 58)

By Order of *Wilber M. Brucker,* Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

HERBERT M. JONES,
Major General, United States Army,
The Adjutant General.

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USA Arty Bd	Gen Depots	Sig Fld Maint Shops
USA Armor Bd	Sig Sec, Gen Depots	Sig Lab
USA Inf Bd	Sig Depots	Mil Dist
USA Air Def Bd	Fld Comd, AFSWP	JBUSMC
USA Abn & Elct Bd	Engr Maint Cen	Units organized under following TOE's:
USA Avn Bd	Army Pictorial Cen	11–7
USA Armor Bd Test Sec	WRAMC	11–16
USA Air Def Bd Test Sec	AFIP	11–57
USA Arctic Test Bd	AMS	11–127
USCONARC	Port of Emb (OS)	11–128
USARADCOM	Trans Terminal Comd	11–500 (AA–AE)
OS Maj Comd	Army Terminals	11–557
Log Comd	OS Sup Agcy	11–587
MDW	USA Sig Pub Agcy	11–592
Armies	USA Sig Comm Engr Agcy	11–597
Corps	USA Comm Agcy	
Div	TASSA	

NG: State AG; units—same as Active Army.

USAR: None.

For explanation of abbreviations used, see AR 320–50.

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